# FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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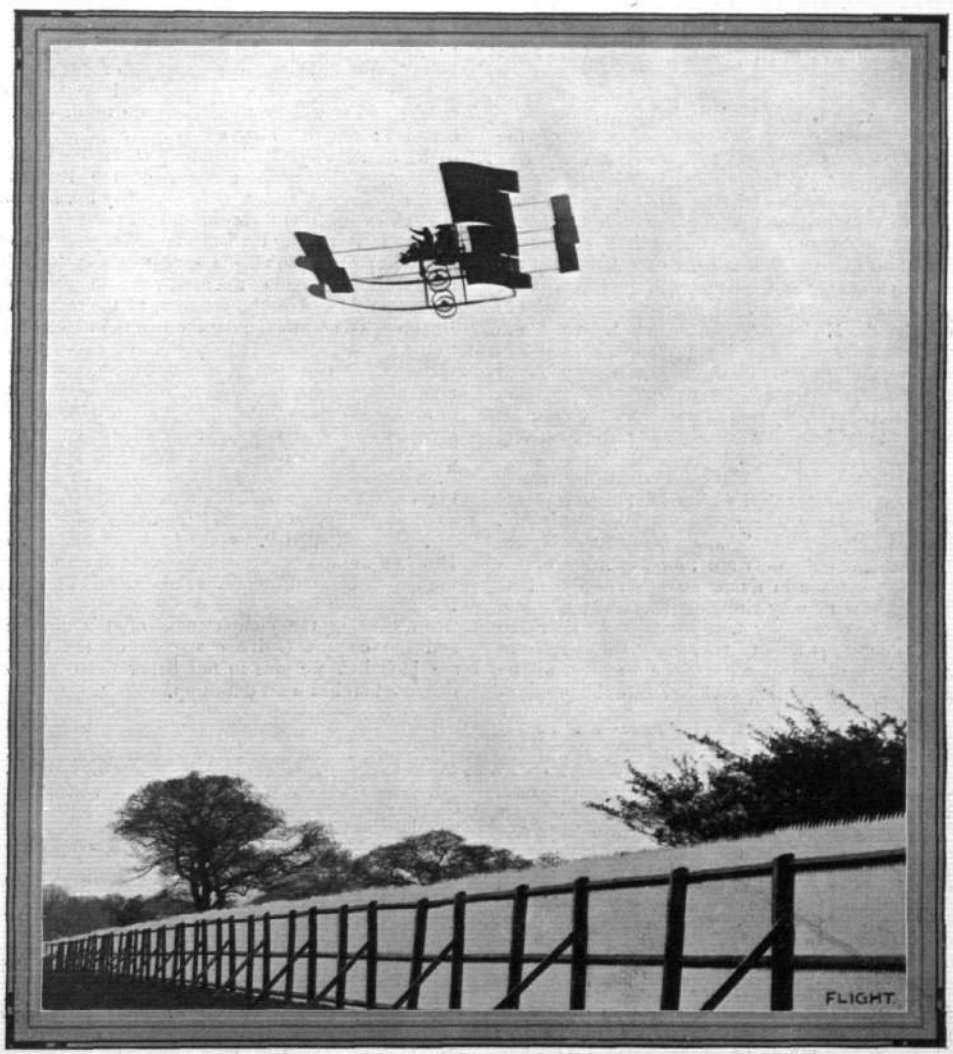


FLYING AT HENDON.—A snap of the pilot of the Valkyrie School flying at the London Aerodrome with one of the Valkyrie Type A monoplanes recently, during some demonstrations before some thousand or more spectators. The pilot was flying for considerable distances with both hands above his head, during one of which our photograph was secured. The photograph was taken from slightly below the machine, so that the most effective view of the picture is by holding it slightly forward and above one's eyes.

# THE HENDON DEMONSTRATION.

SEEMINGLY the present week is likely to become historic in the annals of aeronautics—even if not also in those of the War Office and of Great Britain—as the date of the great awakening of civil and military officialdom to the arrival of a new arm, a new weapon of defence as well as of offence, and a new vehicle of speedy transport, ready to hand in the service of the world's greatest Empire. It is not that any very remarkable or sensational performance has suddenly opened the eyes of those in authority to the progress that has so rapidly and for so many months been going on all around them. No single achievement of the past few weeks has thrown any entirely new light upon the situation. True the London to Paris excursion of M. Prier, the exploits of Mr. Gilmour on boat race day, the Hendon to Brooklands contests for speed, last Saturday's Brooklands to Brighton race, and numberless other like long-distance flights have each added their quota to the magnificent edifice that is being built up as an inheritance to all future generations; but it is only in a general way that recent exploits and recent conquests can be said radically to have changed the outlook from the viewpoint of British officialdom.

Nevertheless, the long-hoped-for softening of the official heart seems at length to have shown signs of having begun. Utterly deaf ears are no longer turned to the urgent protestations of those who would at least have the Government of the day and the War Office evince some slight measure of undisguised curiosity—even if nothing more—in the alleged potentialities of the aeroplane as a danger to the country in the hands of an enemy, and conversely as a fresh guarantee of security in their own hands. No less a personage than Lord Haldane himself is witnessing a series of practical demonstrations, and with him are to be members of the Army Council and some couple of hundred members of Parliament, who, irrespective of party, will thus be able to see for themselves the wisdom of voting adequate monetary supplies when occasion arises.

An altogether admirable and comprehensive programme has moreover been arranged with some fourteen of the leading flying men of the country lending their aid. Weather conditions being in any sense reasonable for open-air manœuvres, proofs are to be afforded of the value of the aeroplane in numerous ways, as also of its utility in actual warfare by virtue of the small space into which it may be packed for transport, and the restricted space in which it is able to rise, solely under its own power. Thus, for example, some of the machines will be despatched on reconnoitring work to locate the positions of troops specially sent out into the country in advance, others will be called upon to take messages to distant points, and some even are to demonstrate their capability of carrying a machine gun from one place to another. Bomb-dropping constitutes yet a further manœuvre that is to be demonstrated, special targets representing battleships and fortresses being erected for the purpose, while similarly experiments are contemplated to represent the relief of a besieged town by means of aeroplanes, food supplies being delivered from above by parachutes.

Already, it must be remembered, the Under Secretary for War has personally made an experimental trip under conditions far from perfect to ensure a smooth passage aloft, and is thus well aware of what an aeroplane can be made to do in expert hands such as those of Mr. Grahame-White. It is only reasonable to suppose that his report must have gone a very long way to bring about the present demonstration; and it is equally reasonable to suppose that what impressed him will inevitably impress Lord Haldane and most of his colleagues. Possibly it may be very difficult indeed to foresee precisely what will be the immediate result of such an occasion; but that after all is not a point that needs to be thrust very forcibly into prominence just at the moment. The main triumph of the Parliamentary Aerial Defence Committee is that they have drawn the authorities out from their official shells.

And it is to the Parliamentary Committee that this apparent great awakening is unquestionably due. Theirs indeed has been one of the most valuable pieces of work hitherto achieved in the interests of the cause in Great Britain. To add to the debt which the movement owes to their skilful diplomacy and their foresight, their stage management of the Hendon demonstration has been admirable in every way, the thoroughly official character of the occasion having been maintained by extending the invitations only to all naval and military officers on the active list. Thus has the full attention of the services been publicly focussed upon the aeroplane in a manner that cannot fail permanently to alter the official attitude as from the present week. Of a truth the labours of Mr. Arthur Lee, M.P. as chairman, and of Mr. Arthur Du Cros as honorary secretary—only to mention two of the Parliamentary Committee stalwarts—is bearing excellent fruit.

As showing the completeness of the arrangements and the comprehensive character of the trials that are included, we give in full below the complete programme that has been drawn up.

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## COMPLETE PROGRAMME FOR THE HENDON DEMONSTRATION.

3.30 p.m.—Inspection of aeroplanes by members of the Board of Admiralty, the Army Council, and members of Parliament.

4.0 p.m.—Speed of erecting and dismantling aeroplane—(*a*) from transport wagon to actual flight; (*b*) from time of landing after flight to time of loading upon wagon ready for transport. Two Blériot monoplanes will be used in this demonstration. Despatch carrying and reliability test across country—(*a*) carrying despatch to Aldershot; (*b*) bringing back reply.

Tests of distance required for rising and alighting. Both monoplanes and biplanes will be used in these tests.

Comparison of speed between monoplane and biplane, monoplanes and biplanes circling the aerodrome simultaneously.

Bomb-throwing—(*a*) by aeroplanes at high speed (at moderate height); (*b*) from aeroplanes hovering in circles at greater height; (*c*) Mr. Grahame-White will drop a missile weighing 100 lbs. from a biplane.

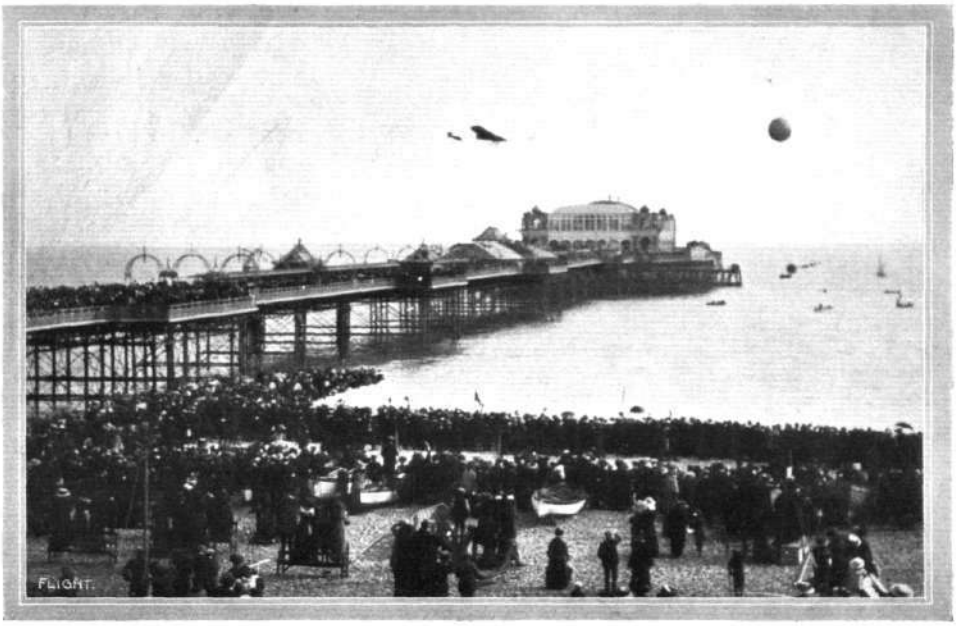
Reconnaissance test, with officers as observers. The officers observing in these tests will be Major Evelyn Wood, D.S.O., Captain Sykes, and Captain Twiss. The reconnaissance would include map-drawing and photography, as well as locating of troops and fortifications.

Machine gun and ammunition carrying—transport of machine gun and operator to a given point.

Attacking an airship. Weather permitting the Army airship "Beta" will arrive from Aldershot and be attacked.

Passenger carrying, in which members of the Board of Admiralty, the Army Council, and the Members of Parliament are invited to participate.

The members of the Parliamentary Aerial Defence Committee desire to acknowledge their special indebtedness to Mr. Claude Grahame-White for his kindness in placing at their disposal his aerodrome and aeroplanes for the purposes of the demonstration and for the valuable assistance which he has rendered them generally.




BROOKLANDS-BRIGHTON RACE.—Gustav Hamel, the winner, crossing the pier at Brighton and winning the race on Saturday last.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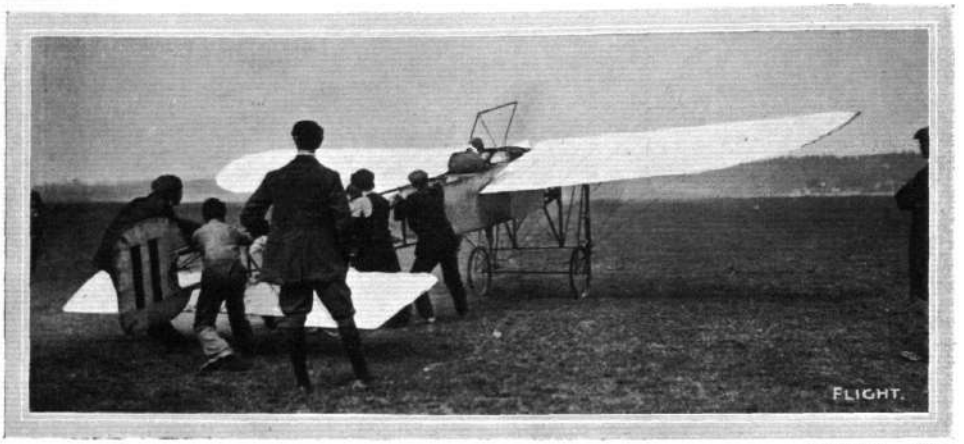
Mr. G. Hamel. Lieut. Snowden-Smith. Mr. Graham Gilmour. Mr. H. Pixton.

THE FOUR PILOTS WHO RACED FROM BROOKLANDS TO BRIGHTON AND BACK ON SATURDAY.

# BROOKLANDS-BRIGHTON RACE.

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STARTING FOR THE BRIGHTON RACE.—Hamel just off on his Blériot.

ALTHOUGH it had to be postponed three times owing to stormy weather, yet that it was possible to hold the Brooklands-Brighton race after all, and that four aeroplanes of different makes should compete and all cover the course, is telling evidence of the progress which is being made in aviation. With a view to making the competition more sporting, it was decided at the last moment to make it a handicap, Mr. G. Hamel on his Blériot monoplane being placed at scratch, while Mr. Graham Gilmour on the Bristol biplane was the limit man. He was sent off at three o'clock, and four minutes later Lieut. Snowden-Smith, who was flying his British-built Farman biplane, constructed by Hewlett and Blondeau, was in the air. Mr. Pixton, on the Avro biplane, should have been the next to go, but at the time he was making a flight for the Manville prize, owing to a misunderstanding as to the time of the race and so missed his start. Mr. Hamel was therefore next away at 3h. 12m. 50s. Mr. Pixton, although he knew he had, under the circumstances, very little chance, started off at twenty minutes past three. All four of the competitors rose to a good height, Snowden-Smith for instance getting up to 2,200 ft., and about ten miles from the start he overtook Graham Gilmour who was flying about 500 ft. lower. Mr. Hamel was steering by compass and he found little difficulty in steering his way. As soon as the news was received at Brighton that the aviators were in the air, a large crowd began to collect on the sea front at Brighton and a few minutes after four the experienced ear caught the loud hum of a motor which told that an aeroplane was not far off. In a few minutes Mr. Hamel was overhead, and, rapidly planing down from a great height, he circled round the captive balloon on the Palace Pier, and then went on to Shoreham, where he made an easy landing. The next arrival was Lieut. Snowden-Smith, and he was very unfortunate in having to forego the second prize, which by time should have fallen to his share, but by reason of an error in following the official course there was no alternative but to disqualify him. When approaching the end of the race he made for what he thought was the Shoreham racecourse, but unfortunately, he steered about a mile inside this point before reaching the coast line and flying over Brighton Pier as prescribed by the rules. His method of carrying his map was primitive; it was just sewn round his left leg above the knee, but by its means without any other knowledge of the district he was able to steer his course to Brighton. He passed over the finishing line very high and then went off to Shoreham, where he landed. Another quarter-of-an-hour and Mr. Gilmour was reported in sight. On reaching Brighton he planed down to within a hundred yards of the water, and then, after circling the captive balloon, rose a little and steered for Shoreham. The last arrival was not until twenty past six, when Mr. C. H. Pixton came in. He reported that after steering due south by his compass for fifty minutes he lost his bearings and decided to come down at the first suitable point to enquire his way. In the distance he perceived what seemed to be a long narrow field, and on


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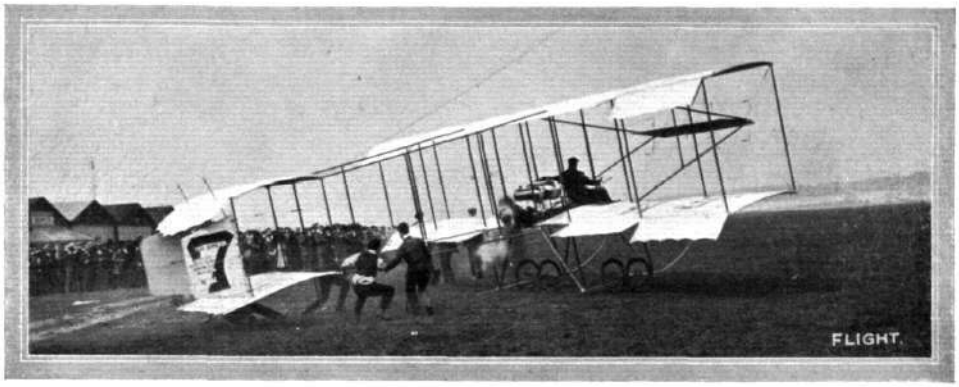
STARTING FOR THE BRIGHTON RACE.—Lieut. Snowden-Smith just released for his start on his British-built Farman biplane for Brighton.

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**STARTING FOR THE BRIGHTON RACE.—Mr. Graham Gilmour leaving Brooklands aerodrome on a Bristol biplane in the Brighton Race.**

alighting discovered that it was Plumpton racecourse and that he was only some 9 miles from Brighton. The village was scoured for petrol and oil, and by the time this was obtained it was ascertained that the other competitors had arrived at Brighton, so Mr. Pixton decided to have tea before going on. After the meal, arrangements were made for a restart, and this led to an amusing incident, albeit a somewhat annoying one. Six big men were engaged to hold on to the tail, and they were told that as soon as the engine started the machine would pull very strongly, but they were not to let go. They evidently anticipated, however, that the machine would rise vertically like a balloon, and they all pulled downwards with one accord. The result was a broken tail-post, which took about an hour to splice up. At last, however, the machine got away, and, after flying over both piers at Brighton, Mr. Pixton came down at Shoreham.

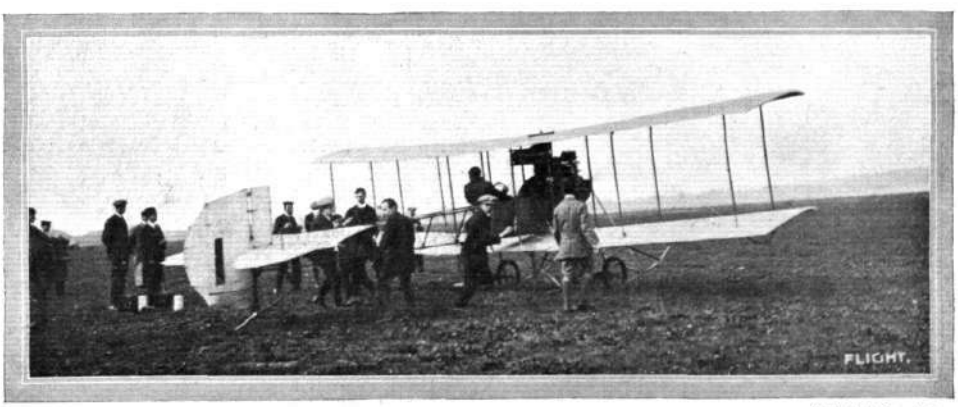
The times occupied by the three prizewinners were :—Hamel, 57m. 10s. ; Snowden-Smith, 1h. 21m. 6s. ; and Gilmour, 1h. 37m.

The first prize of £80 was awarded to Mr. Hamel, the second of £30 to Mr. Gilmour, and Lieut. Snowden-Smith received £20, the prizes being distributed at the Royal York Hotel, on Monday, by the Mayoress, Mrs. Thomas Stanford. The prize list was added to by a £10 note presented by a visitor to Brighton.

### After the Race.

MR. HAMEL only rested a short time at Shoreham, and at 20 minutes to six he started off to return to Brooklands, where as a matter of fact he arrived safely, thirty-four minutes later, the journey having been made in record time. The other three aviators stayed over night, and on the following morning they all made exhibition flights over the Shoreham Aerodrome and out to sea. Lieut. Snowden-Smith returned to Brooklands on Sunday afternoon, while Mr. Pixton, also on Sunday afternoon, flew to Hayward's Heath in order to accept the invitation of Mr. England. He rose to a height of about 4,000 feet, and crossing over Hove followed the railway lines to his destination. He landed on the lawn at Oakhurst, the delightful residence of Mr. and Mrs. England, who had had a great white cross laid on the grass to guide their guest. Staying the night at Hayward's Heath he continued on to Brooklands on Monday afternoon, having rather a rough passage, as the wind was blowing between 15 and 20 miles an hour. Mr. Gilmour stayed at Shoreham, as he had an arrangement to fly with Mr. Morison on Wednesday, and in the afternoon of Sunday he flew over from Shoreham to Brighton and after circling round the Palace Pier landed at Hove, from whence the return journey was made late in the afternoon.

On Monday evening Mr. Graham Gilmour flew over to Portsmouth in order to visit a relation at the Haslar Hospital. On the way he passed over Fort Blockhouse, a submarine depôt, which he proceeded to "shell" with a few oranges. He also circled over the harbour once or twice, and eventually after a flight of about 40 miles landed in the centre of the Haslar recreation ground. This is not very large, and is bordered on one side by the sea wall and on the other by some trees, but Mr. Gilmour came down without difficulty. The aviator's arrival was not unexpected, and he was warmly congratulated on the success of his exploit.

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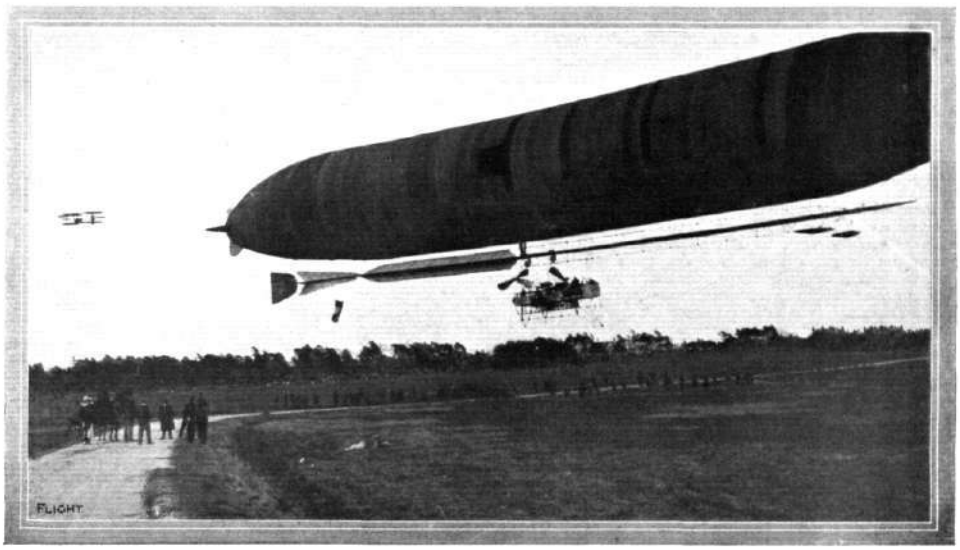
**STARTING FOR THE BRIGHTON RACE.—Mr. H. Pixton getting away for Brighton from Brooklands on the Roe biplane.**


THE DISASTER TO THE *MORNING POST* LEBAUDY AIRSHIP.—A flashlight snapshot of the wreckage over Woodlands Cottage before the salvage party had got down the gas-bag.


THE DISASTER TO THE *MORNING POST* LEBAUDY DIRIGIBLE.—A general view of Woodlands Cottage the day after the disaster, showing the rigid framework of the airship after the gas-bag had been removed.

# THE SECOND DISASTER TO THE NATIONAL FUND AIRSHIP.

THE great Lebaudy airship built for the National Fund inaugurated by the *Morning Post* with a view to the purchase and presentation of the dirigible to the British Army is pursued in a most relentless manner by an unkind Fate. It will be remembered that after making a splendid journey from Moissons to Farnborough last autumn the airship was, when entering the hangar, wrecked through the envelope being torn by a girder projecting from the roof of the shed. The repairs have taken a considerable time, but last week everything was ready and M. Louis Capazza, who was in charge, decided on Thursday afternoon that the conditions were favourable and arrangements were at once made for bringing the airship out for one of the tests as originally required, preliminary to the vessel being taken over by the National Airship Fund and being take her, and as the engines had been stopped, the dirigible drifted towards the rising ground. The guide-rope trailed across trees and the sheds and had the effect of bringing the airship broadside on to the wind, so that she became practically unmanageable. In order to bring the airship again under control the two 100-h.p. Panhard engines were started up again, but it was too late, as the low altitude at which she was travelling brought her crashing into the fir trees after passing over the Farnborough to Farnham road in front of Woodlands Cottage. These pierced the envelope and the vessel then settled down with one end of its rigid framework supported by the trees and the other end resting on the roof of the house. To this fact the occupants of the car no doubt owe their lives, none of them sustaining more serious




THE DISASTER TO THE *MORNING POST* LEBAUDY DIRIGIBLE.—The huge airship over Farnborough shortly before the accident. To the left will be noticed Mr. S. F. Cody on his biplane circling round the leviathan.

passed on to the Government. A few minutes after seven the ascent was made, among the seven passengers on board being M. Capazza, the pilot, M. Julliot, who designed the craft, and Major Sir A. Bannerman, Commandant of the Air Battalion. The airship rose to a height of 780 ft. and at that altitude a wide circuit was made over the neighbourhood of Farnborough. M. Capazza then gave orders to descend, but at the first attempt the airship was not low enough for the soldiers, who were waiting, to grasp the tow-ropes, and so another but smaller circuit had to be made, but with the same result.

A third time the airship travelled round, and although she was then low enough, unfortunately she could not be brought to the point where the sappers were waiting to receive the ropes. Although they sprinted after the airship they were unable to over-

injury than a few bruises. The airship, as may be judged from our photos, became a total wreck, the framework being buckled and broken, while over it all like a shroud hung the tattered envelope. The work of salvage was at once put in hand, and by the aid of searchlights was continued throughout the night. At the part of the road where the catastrophe occurred a great crowd of spectators had assembled, but no one sustained serious injury, although one or two of the onlookers were knocked down by the tow-ropes, &c. Considerable damage was done to the roof of the house, the residence of Capt. and Lady Follett, but fortunately none of the occupants were any the worse for the unwelcome intrusion. M. Capazza has stated that, although the damage is serious, the airship can be repaired and made fit for service again in the course of six weeks or a couple of months.

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## The Bristol Mission in New South Wales.

EVIDENTLY the visit of Mr. J. J. Hammond and Mr. McDonald with their Bristol biplanes to New South Wales has not been without its effect upon the Government. On the 3rd inst. Mr. Hammond carried Captain Neisigh from Sydney to Liverpool Camp, a distance of 22 miles, and the officer was able to take a valuable series of notes of his observations. On landing at Liverpool the aviator was warmly congratulated by Lord Dudley, the Governor-General. On Friday, Mr. Hammond was back at Sydney and created considerable excitement by flying over the warships lying at anchor in the harbour. During the forty minutes he was circling above the warships Mr. Hammond was accompanied by a passenger, Mr. Coles. His altitude was about 3,000 ft. While Mr. Hammond was flying over the harbour, Mr. McDonald started off on another Bristol biplane and at a height of about 2,000 ft. circled over Sydney.

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## The European Circuit.

ELEVEN more entries have been received for the European Circuit, thus making the total number eighteen. All the newcomers are from France, and include four Sommer monoplanes to be piloted by Bathiat, Kimmerling, Molla, and Martin, respectively; three Blériot monoplanes, for whom no pilots have yet been named, and four Deperdussin monoplanes, three of which will be handled by "Pierre Marie," Vidart, and Busson, respectively.

The various stages of the flight are from Paris to Rheims (125 kiloms.), Liege (195 kiloms.), Spa (30 kiloms.), Utrecht (180 kiloms.), Brussels (150 kiloms.), Roubaix (90 kiloms.), Calais (110 kiloms.), English Coast (40 kiloms.), London (110 kiloms.), Calais (150 kiloms.), Amiens (130 kiloms.), Vincennes (120 kiloms.), thus making the total distance about 1,500 kiloms.

# BRITISH NOTES OF THE WEEK.

### Our Prize Model Scheme.

FURTHER contributions have been received in connection with our Prize Model Scheme from the following :—

H. S. Green. H. C. Davis and P. Appleyard (1).
H. C. Davis and P. Appleyard (2).

### Next Paper at the R.A.C.

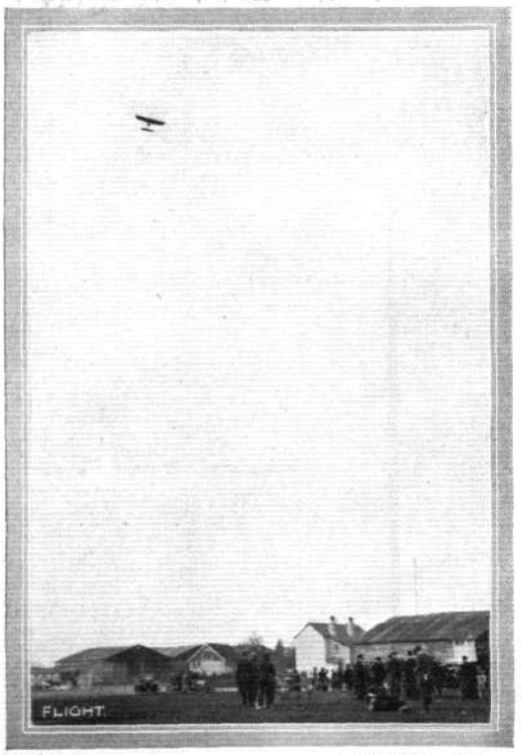
THE considerable attention which has been given to the subject of gyro compasses lately, makes the paper which is to be read at the Royal Automobile Club on Wednesday evening of topical interest. Mr. G. K. Elphinstone will give, by the aid of a complete working equipment, an explanation of the gyro compass such as is employed in the later ships of our own Navy. The paper will be illustrated by numerous lantern slides, and will appeal not only to those interested in Naval matters but also to those who make a close study of aviation problems.

### Why Not an Aerial Review at Spithead?

A RESIDENT in the Isle of Wight, no doubt remembering the successful flights made by Mr. Grahame-White over the British Fleet in Torbay last year, has suggested that it would be timely if an Aerial Review were held at Spithead next month during the same time as the Naval Review. He points out that the weather then would most probably be as suitable for flying as at any time of the year, while the occasion is about as opportune as could be found for demonstrating the utility of airmanship as a connecting link between the naval and military forces.

### The Coronation Meeting at Southport.

A DEFINITE agreement has now been concluded by the Local Committee at Southport with Mr. Grahame-White for a series of exhibition flights on Coronation Day, as well as the following Friday, Saturday and Monday. The flights will be made at the Blowick Athletic Ground, and towards the guarantee fund of £2,000 the sum of £1,769 has already been obtained.

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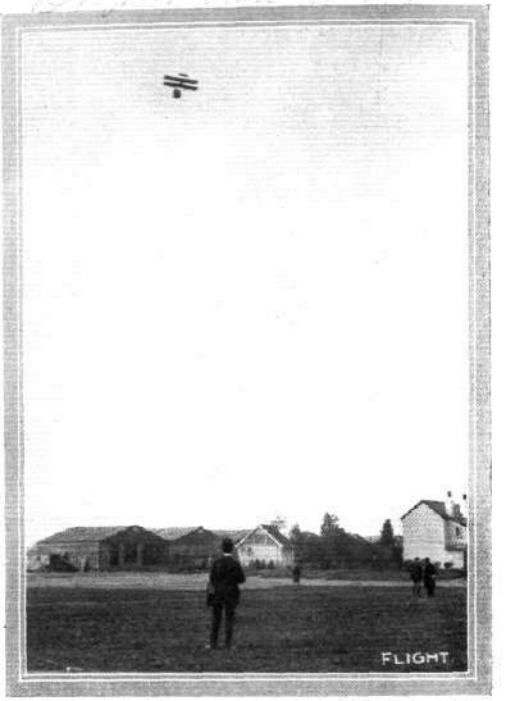
**BROOKLANDS TO BRIGHTON RACE.—Hamel, the winner, after one circuit of the aerodrome, passing away for his trip to Brighton.**

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**BROOKLANDS TO BRIGHTON RACE.—Graham Gilmour well up over Brooklands for the Brighton Race.**

### Flying at Aldershot.

WHILE the National Fund airship was out at Farnborough on Thursday of last week quite an amount of flying on aeroplanes was also in progress. Capt. Fulton was up on the Paulhan machine, Capt. Burke was using the Farman, and Mr. de Havilland on the biplane of his own design, while Mr. Cody flew over from Laffan's Plain. At half-past six, Lieut. Cammel, on the two-seater Blériot, accompanied by Lieut. Fox, set out to fly to Salisbury, but was compelled to land at Basing. On the following day Capt. Fulton was flying on the Paulhan machine and when passing the big airship shed was caught by a sudden gust of wind which drove the machine down sideways. It landed on one of the wings, which was crumpled up, but the pilot escaped without injury.

### An Aeroplane "Up a Tree."

MR. O. C. MORISON and Mr. Gordon England had an exciting experience at Haywards Heath on Tuesday when starting for a trip to Shoreham on a Bristol biplane. They had not long got away when the engine apparently failed whilst passing over a wood, and the aeroplane came down and rested in the embrace of a big oak tree. By means of ladders the two aviators were rescued from their uncomfortable position, but the biplane had to remain suspended for the night.

### A "Moonlight" Meeting at Brooklands.

TAKING advantage of the fact that the moon will be at the full to-night (Saturday), special arrangements have been made by Messrs. Keith Prowse and Co. for a series of cross-country flights to take place from Brooklands. The aeroplanes will ascend with searchlights and passengers will be carried, five guineas having been fixed upon as the minimum charge for each passenger flight. The idea is such an attractive one that it is likely to draw a large number of visitors to Brooklands, and Messrs. Keith Prowse and Co., Ltd., explain that the time to arrive at the course is from nine to half-past.

### Scotland's First Flying School.

ARRANGEMENTS have now been made by Mr. W. H. McEwen, of Glasgow, to open a flying school on the ground which was used for the Lanark Aviation Meeting last year. The aerodrome is conveniently situated as regards the principal centres in Scotland, and should command a large *clientèle* among Scottish aspirants for flying honours. Mr. McEwen won his certificate on a Blériot machine some time ago, and it is with this type of machine that the school will be opened, but other types are to be added as soon as possible. Mr. McEwen is also arranging to give passenger and cross-country flights.

### An Aerodrome on Deeside.

THE possibility of an aeroplane being seen circling above the King's Scottish home at Balmoral during the autumn is not a very remote one, as arrangements are being made by Mr. Keiller, of Morven, for the laying out of an aerodrome on the banks of the River Dee, near Bridge of Gairn. The ground is about six miles distant from Balmoral Castle, and is about half a mile in length, and from 400 to 500 ft. wide. It is perfectly flat, and at one time was covered by the river, hence its name Dalbagie, which is Gaelic for "drowned haugh." It is expected that the ground will be ready for use by the autumn.

### Capt. Sanders Flies at Beccles.

USING one of his new biplanes, Capt. Sanders on the 30th ult. made three good trial flights on Beccles Common, rising during one attempt to a height of 40 ft. and attaining a speed of about 40 miles an hour. Unfortunately, the third flight was concluded by a mishap, the tail of the machine sustaining some damage, but the pilot escaped unhurt.

### A Bristol Over a Bristol.

THE bluejackets aboard H.M.S. "Bristol," lying at anchor at Avonmouth, were rather surprised on Friday afternoon of last week to observe a biplane flying directly over them. It proved to be a Bristol machine which had started from the Bristol works at Filton. It was piloted by M. Tetard, who, in the course of his twenty-three minute flight to Avonmouth and back, kept his machine mostly at a height of 2,000 ft.

### Ante-Breakfast Trial Trips.

BEFORE breakfast on Saturday last Mr. Higginbotham twice carried his mechanic on his biplane from Freshfield to Southport and back, the approximate distance covered being fifty miles.

### Eastbourne and the European Circuit.

AT last week's meeting of the Eastbourne Town Council the question of making Eastbourne one of the stopping places of the European Circuit was considered. Although no definite action was decided upon the action of the Aviation Committee in entertaining the proposal was approved and the Mayor appealed to members of the Council to come forward to help with the guarantee fund.

### To Avoid Puncture.

ONE of the most vulnerable parts of an aeroplane is the tyres, and those who have suffered at all from punctures will doubtless make a note of the fact that Messrs. L. D. Gibbs and Co., Ltd., have found the Atlas puncture-proof inner cases very reliable in practice, having fitted them to their aeroplane wheels. Those desiring particulars should write the Atlas Co., at 124, High Street, Kensington, W.

### An Aeroplane for the Antarctic.

INCLUDED in the equipment of the expedition which is to be taken by Dr. Douglas Mawson to the Antarctic regions will be a monoplane, probably of the R.E.P. type. Arrangements are being made by Lieut. Hugh E. Watkins to pilot the machine, which it is expected will shortly be tested at the flying ground of Messrs. Vickers, Ltd., near London. A special screen will also be fitted to protect the pilot and passenger from cold, while the chassis will be modified in view of the necessity for rising from and landing on snow.

### An Exciting Balloon Adventure.

A PARTY of balloonists, consisting of Capt. Maitland, Lieut. Barrington Kennett, Mr. Hargreaves, and two ladies, had an exciting experience on Saturday afternoon last. A start had been made from Wandsworth at 3 o'clock, and when over Southfields apparently something went wrong with the gas valve. The balloon descended rapidly, and, just missing the spire of a church, landed on the roof of a newsagent's shop, where, by the aid of passers-by, it was eventually secured, but not before considerable damage had been done to roofs and chimney stacks. The occupants of the balloon fortunately escaped injury.

### The Naval Airship.

A GOOD number of conflicting stories were spun round the little incident which occurred on Wednesday of last week in the great shed at Barrow, in which the Naval airship has been built with so much secrecy. It appears that one of the eighteen ballonets was slightly nipped, but that the damage was not serious is shown by the fact that it was repaired in about an hour and a half. Another "canard" to the effect that all the hydrogen used for inflating the airship came from Holland is disproved by the photograph which we reproduce this week, which shows a train load of eleven trucks filled with tubes of hydrogen being despatched from the Knowles Oxygen Co.'s works at Wolverhampton. Some idea of the size of the airship may be gathered from the fact that the ballonets hold 706,330 cubic ft. of gas, while for the air chambers no less than 14,000 sq. yds. of Continental balloon material was required. Several adjustments have yet to be made before the great airship will be ready to undergo her trials, but is probable she will commence them early next week if the weather is calm. In point of fact she had a peep out of the shed on Tuesday afternoon, but caution was the watchword, and she retired into her shell again. The Marines, however, put in some most valuable drill in handling the dirigible.


MAINLY BRITISH HYDROGEN.—Although, as admitted in the House of Commons, some of the hydrogen used for inflating the new naval airship, built by Messrs. Vickers, Ltd., at Barrow, may have come from Holland, our photograph above shows that Britishers are not *entirely* left out in the cold. The eleven trucks seen contain hydrogen cylinders for the re-filling of the great dirigible, and the gas is the product of the Knowles Oxygen Co., Ltd., of Wolverhampton, whose big establishment there is equal to any demands made upon it for the supply of the "all-British" production. The trucks are standing on the Knowles Co.'s siding.

# The Royal Aero Club of the United Kingdom

## OFFICIAL NOTICES TO MEMBERS

### Committee Meeting.

A MEETING of the Committee was held on Tuesday, the 9th inst., when there were present:—Mr. R. W. Wallace, K.C., in the Chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Col. H. C. L. Holden, R.A., F.R.S., Prof. A. K. Huntington, Mr. Alec Ogilvie, Mr. C. F. Pollock, and Harold E. Perrin, Secretary.

**New Members.**—The following new members were elected:—Charles A. Chaplin, Jack Thomas Grein, Alexander Edward Hukins, Dominic Lawrence Santoni, and Lieut. Neville F. Usborne, R.N.

**Aviators' Certificates.**—The following Aviators' Certificates were granted:—

78. Hubert Oxley.
79. Harold Blackburn.
80. R. C. Kemp.
81. R. W. Philpott.
82. W. H. Dolphin.
83. Lieut. C. H. Marks.
84. Capt. S. D. Massy.
85. F. P. Raynham.

**Flights for Certificates.**—In connection with the flights undertaken by aviators for their certificates, a danger has arisen from the fact that the new conditions entail both right-hand and left-hand turns, thus causing confusion in cases where aviators, other than the candidate, are flying at the same time. To meet this difficulty, the Committee of the Royal Aero Club has decided to issue a special instruction to observers that flights for certificates are only to be carried out when the course is clear.

**Brooklands to Brighton Race.**—The award of the Judges was confirmed as follows:—

1st prize, G. Hamel. 2nd prize, D. G. Gilmour.

Lieut. T. Snowden-Smith, who was the second to arrive at Brighton, was disqualified for not keeping the course as laid down in the rules.

It was also reported to the Committee that Lieut. T. Snowden-Smith contravened the rules in making his flight over the town of Brighton, and it was decided to caution him against a repetition of such an infringement of the Club's prohibition of flights over thickly populated areas.

### "Daily Mail" Second £10,000 Prize.

Entries for this Competition close at 12 noon on June 1st, 1911. The entrance fee is £100, payable in one sum or as follows:—

£25 by 12 noon on June 1st; £75 by 12 noon on July 1st.

Late entries will be received up to 12 noon, July 1st, 1911, in which case the entry fee will be £200.

Copies of the rules and entry form can be obtained from the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

Mr. Ernest C. Bucknall and the Secretary visited the West of England last week to inspect the alighting places at Bristol and Exeter. The representative of the Bristol and West of England Aero Club accompanied them to the grounds adjoining the factory of the British and Colonial Aeroplane Co., Ltd., at Filton, which is about three miles north of Bristol. These grounds will afford a good alighting place for the Bristol Control. They are so situated that a flag erected there can be seen for many miles and enable the competitors to get on the line to Exeter without flying over the town of Bristol.

At Exeter, the Club officials were assisted by the Mayor and Town Clerk, and Mr. S. Moreton White, the last-named gentleman providing motor cars for the party. An extensive tour was made, and great difficulty was experienced in finding a suitable spot in Exeter, owing to its somewhat peculiar situation. After inspecting many sites, it was decided, subject to the consent of the owners being obtained, to fix upon a ground at New Court, about 3 miles south-east of Exeter. This ground can be easily seen for many miles, and has many excellent landmarks to assist the competitors. Here again the competitors will be able to avoid flying over the city of Exeter.

The contest is being keenly looked forward to in both these cities, and every assistance has been promised to the Club.

During the next fortnight the Club officials will visit Harrogate, Newcastle-on-Tyne, and the towns in Scotland forming part of the route.

### Balloon Committee.

A meeting of the Balloon Committee was held on Tuesday, the 9th inst., when there were present:—Mr. Griffith Brewer, in the Chair, Mr. C. F. Pollock, Maj. Sir A. Bannerman, Bart, R.E.

The programme of events for Hurlingham was fixed.

The following regulation was adopted:—

"In Club Balloon Contests a competitor may use hydrogen for the inflation of his balloon instead of using coal gas, provided he employs a balloon of less than half the capacity stipulated for use with coal gas; or he may inflate his balloon partly with coal gas and partly with hydrogen, provided that for every 1,000 ft. of hydrogen employed the size of his balloon must be diminished by 1,000 ft. below that of the size allowed."

### Hurlingham Balloon Contests.

The ollowing fixtures have been definitely fixed:—

Saturday, May 27th:—Point-to-Point Race for a Cup presented by Lord Llangattock.

Saturday, June 24th:—Perimeter Race for a Cup presented by Mr. A. Mortimer Singer.

Saturday, July 15th:—Long Distance Race for the Hedges Butler Challenge Cup.

### The Manville £500 Prize.

The second date for this competition was Saturday last, the 6th inst., and C. Howard Pixton at Brooklands on the Roe biplane, carrying a passenger, made a flight of 26 minutes 30 seconds. This flight, together with the time allowance, counts as 31 minutes in this competition. The total weight of pilot and passenger was 20 stone 7 lbs.

### Sub-Committees.

**Publication Committee.**—R. Wherry Anderson, John Dunville, C. F. Pollock, and Stanley Spooner.

### Presentations to Library.

Messrs. C. Grahame-White and Harry Harper have kindly presented a copy of their book, "The Aeroplane: Past, Present, and Future," to the Club.

Capt. S. C. G. F. Astell, D.S.O., J.P., has kindly presented a picture of the first carriage "Ariel" to the Club.

### International Cartographic Conference.

The International Cartographic Conference will be held in Brussels on the 26th and 27th inst., and Mr. Griffith Brewer has been nominated the delegate to attend on behalf of the Royal Aero Club.

### Training of Naval Officers at Eastchurch.

The four Naval officers who have been undergoing a course of instruction in flying at the Club's flying grounds at Eastchurch, under the guidance of Mr. G. B. Cockburn, have all succeeded in obtaining their aviators' certificates in accordance with the new rules.

The Committee at its meeting on Tuesday last unanimously passed a resolution warmly thanking Mr. G. B. Cockburn for the generous way in which he had devoted himself to the instruction of the Naval officers.

HAROLD E. PERRIN,
Secretary.

166, Piccadilly.

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### "Elementary Aeronautics."

IT is a little doubtful whether this book, by Mr. A. P. Thruston, should be described as strictly relating to elementary aeronautics, for although the subject matter is not particularly advanced, it is of the technical character that renders a more explanatory introduction necessary to the real beginner. To the technical student, however, it may contain kernels of information in an acceptable form. In the short space of 120 pages the author makes an attempt to cover an uncommonly wide field, and it is not unnatural that much should be left to the reader. Some of the most interesting illustrations in the book are photographs of the flow of fluids issuing from jets impinging upon obstructions of different shapes. Chapters are devoted to flat planes, cambered planes, stability, propellers, helicopters, and different types of aeroplanes and engines.—(*Whittaker and Co.* Price 3*s.* 6*d.* net.)

# PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

### Aero-Models Association (Western Branch).

A SLOW flying competition will be held at the Branch Flying Ground, Noel Road, Acton, W., on Saturday, July 22nd, at 2.30 p.m., when an antimony rose bowl, kindly presented by Mr. A. P. Wilkins, will be offered for competition.

The general competition rules of the Association will govern the contest, with the addition of the following special rules:—1. The course will be 150 yards in a straight line. 2. Each model shall start from the ground on a line ten yards behind the starting-post, and must leave the ground under its own power before reaching the starting line. 3. No result shall count if the model touches the ground between the starting and finishing lines. 4. Each model shall be allowed three attempts. 5. The prize will be awarded to the owner of the model which completes the course in the slowest time.

### Bristol and West of England Ae.C. (STAR LIFE BLDGS., BRISTOL).

A LARGE number of members joined in the excursion by motor car to the flying ground of the British and Colonial Aeroplane Co. on Salisbury Plain on Saturday morning last. The cars arrived at Larkhill shortly after noon, when the wind was a little too choppy for flying. Lunch was therefore taken in one of the sheds, after which the various machines were inspected. During the afternoon the wind dropped, and about half past two M. Jullerot got into the military type machine and went for a short spin. A little later Mr. Pizzy mounted one of the ordinary type Bristol biplanes, and he and M. Jullerot made several very impressive flights, while afterwards Mr. Fleming also joined the others in the air, and flying was continued until just on 8 o'clock.

### Kite and Model Aeroplane Assoc. (27, VICTORY RD., WIMBLEDON)

MEMBERS are asked to make a note of the date of Mr. Cody's lecture, viz., May 19th. The hon. sec. will be pleased to forward tickets to anyone wishing to attend this lecture, which is bound to be both interesting and instructive.

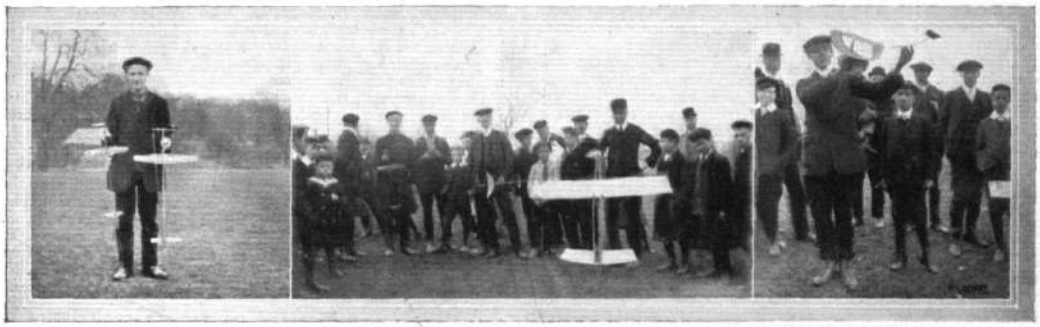
The first competition will be held on Wimbledon Common on Saturday, May 20th, when the Baden-Powell Shield for the best kite of the year will be competed for. A Junior Kite Competition will follow, and the prizes will be: 1st, silver medal and £1; 2nd bronze medal and 12s. 6d.; 3rd, bronze medal and 7s. 6d., which should be very useful to schoolboys.

The hon. sec. will be pleased to forward a programme of events for the year to anyone upon application. The programme consists of competitions on the Sports Ground, Crystal Palace, London Aviation Ground, Wimbledon Common, &c.

Members will be pleased to hear that arrangements have been made whereby competitors at the Palace will be able to travel from London or intermediate stations, by L.B. and S.C.R. or South Eastern Railway, at the following return fares: 1st class, 8d.; 2nd. 6d.; 3rd, 4d., as well as, of course, free admission to the Palace.

### Sheffield Model Aero Club (35, PENRHYN ROAD).

THE club will hold a general meeting at Staniland's Restaurant, West Street (opposite Carver Street,) on Wednesday, May 17th, at 8 p.m., to arrange for prizes, &c., for a model flying competition which is to take place on Whit-Monday. All those interested and wishing to become members are requested to be present. All communications to be made to the secretary, C. F. W. Cudworth, 35, Penrhyn Road, Hunter's Bar.



Photos by C. F. W. Cudworth.

**THE SHEFFIELD MODEL AERO CLUB—EASTER MONDAY MEETING.—In the centre of the middle group is Mr. A. D. Coates, with his one-ounce model which accomplished a flight of 250 yards. On the left and right respectively are Mr. H. Slack and Mr. M. D. Manton, members of the Club, with their models.**

## SCHOOL AERO CLUB.

### Arundel House School Ae.C. (15, ARLINGTON ROAD, SURBITON).

A MODEL glider competition has been arranged for Saturday, June 3rd, on Oxshott Hill. The tests imposed will be (*a*) distance, (*b*) duration, (*c*) stability, (*d*) steering, and (*e*) construction, and flights will commence at 3 p.m.

On Wednesday, May 3rd, Cyril Ridley succeeded in raising the distance record for Ridleyplanes to just over a thousand feet. The flight occupied approximately 45 secs.

On Saturday last the Mann monoplane, No. 33, specially built to order for another club member, underwent preliminary trials, and proved its ability to fly the quarter mile and keep the air for a minute. There is a great demand for these "quarter-milers" from outsiders, and quite a number of long-distance models are in course of construction.

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### The Universal Aviation Co., Ltd.

THE Company heretofore known as L. D. Gibbs and Co., Ltd., of 166, Piccadilly, has, we are notified, changed its name, with the permission of the company authorities, and in future will be known as the Universal Aviation Co., Ltd.

### The Vogue of Flying.

Up to the present one of the greatest stumbling-blocks to many who have wished to take up the sport of flying, has been the expense both of buying a machine and also of its maintenance. It is very suggestive, therefore, to observe that several makers are turning their attention to building machines which, although moderate in price and fitted with engines of about 30-h.p., give most excellent results. The Avro biplane is a case in point, and its performances on Saturday last show that it is a thoroughly capable machine, in spite of the fact that it is a good deal smaller than most machines and about half the price. After flying with a passenger for 26 minutes, Mr. Pixton set off for Brighton, which, as is told elsewhere, he reached safely. This machine is fitted with a 30-h.p. Green engine that has proved itself well able to deal with the task imposed upon it.

# FROM THE BRITISH FLYING GROUNDS.

## Royal Aero Club Flying Ground, Eastchurch.

THERE was a continuance of the fine weather at Eastchurch during last week, and a considerable amount of flying practice was possible, including a number of *vols plané*. In this very essential part of an aviator's training the Naval officers here are becoming very proficient, and some good glides were witnessed during the week.

On Wednesday, Lieut. C. R. Samson, R.N., was out on the Short biplane, making a fine cross-country flight to Sheerness, passing out over the warships lying at anchor, and being greeted in his flight by a chorus of sirens from the shipping below. Thus, for the first time in the history of the British Navy, one of its officers has flown over the Fleet, an event which marks another little notch in the progress in aviation in this country. Returning by way of Warden Cliffs, Lieut. Samson completed the journey with a *vol plané* from a height of 600 ft., alighting at the door of the aeroplane shed. Earlier in the day Lieut. A. M. Longmore, R.N., on the same machine, ascended to a height of 2,000 ft., from which elevation he had an excellent view of the Island of Sheppey, the whole of which could be seen with great distinctness.

Several well-known people visited the grounds during the week, including the Hon. Mrs. Assheton-Harbord, who is so well known as a balloonist. Mrs. Harbord was taken as a passenger on the Short biplane, and much enjoyed the experience, although it was by no means her first flight on an aeroplane. In the afternoon, Lieut. Gerrard, R.N., tried some passenger-carrying flights, having on board Mr. Oswald Short, and afterwards Mr. Dodson.

Lieut. Gerrard exhibits consummate control over his machine, flying with great steadiness, and making sharp right-hand and left-hand turns with the utmost facility. Later on Lieut. Samson took up as passengers Mr. Barrett and Mr. Chapman, two of Messrs. Short Bros. engine mechanics.

Saturday was an excellent flying day, and several hours practice were obtained. In addition to the Short biplanes, the Jezzi aeroplane and Prof. Huntington's machine were out during the afternoon. The Jezzi machine is, as our readers will remember, a biplane similar, at first sight, to a Wright aeroplane, but it is very different in construction. It is fitted with two tractor screws, and the aviator is seated behind the engine at a point about 3 ft. from the rear edge of the main planes. The whole machine is very close to the ground, the clearance of the lower plane being apparently not more than 2 ft. Mr. Cooper, who was piloting the machine, made several short flights, the machine appearing to lift well.

Prof. Huntington was out testing a new kind of warping lever which he has recently fitted to his machine, and he made some short trial flights at an elevation of about 40 ft.

Prof. Huntington's machine is of the Dunne type, being one of the very earliest of Capt. Dunne's designs, and was constructed at the Short factory at Shellbeach in the early part of 1909. In appearance it does not bear much likeness to the latest Dunne aeroplanes, two of which are now under construction here, although the same general principle of natural stability is embodied in its design.


**M. H. Pequet, who has recently returned from his very successful flying exhibitions at Allahabad, where he conveyed the first aerial post ever officially recognised. M. Pequet is flying for Messrs. Humber, Ltd., at Brooklands on a Humber biplane, Sommer type, the machine on which he is seen being the biplane exhibited at the last Olympia Aero Show. Early last Saturday he made two flights of a quarter of an hour's duration, and on Sunday morning he was flying for 1 hr. and 10 mins., during which he first covered several circuits of the Brooklands course, and then made a cross-country flight over Walton and Weybridge.**

## Brooklands Aerodrome.

Avro School.—This has been a notable week for Messrs. A. V. Roe and Co., as their latest type of Avro-biplane has continued to add further successes to its credit, the more remarkable by reason of its small size and power and its great lifting capacity. It is fitted with an ordinary 30-h.p. Green which has no auxiliary exhausts, the tractor being direct coupled to the engine and not gear driven, as has been stated elsewhere. The day of the popular cheap aeroplane seems to be coming nearer.

Mr. Conway Jenkins' success has been quickly followed by Mr. Ronald Kemp and Mr. Raynham. The former on this machine gained his certificate in great style on Thursday, whilst on Saturday Mr. Raynham, at about his fourth time on the same machine, rose to about 1,000 feet while flying for his certificate.

During the week Mr. Pixton has been carrying passengers up to 14½ stone for several miles outside the track, and as Mr. Pixton is himself 12 stone, this represents a useful load of 26½ stone. On Thursday afternoon a strong wind was blowing but Mr. Pixton did not hesitate to take up a 13-stone passenger outside the track. On Friday, a new pupil, Mr. Stanley-Adams, made some straight flights, rising to 30 ft. on the Avro biplane, whilst Raynham did some figures of eight 400 ft. high.

Mr. Pixton, on Saturday, had a turn for the Manville prize of £500 and put in 26 mins. 30 secs. As he understood the Brighton race did not begin until 3.30 he was still going round when the event was started. Consequently he was unable to get off in time to avail himself fully of his handicap and the competitors were out of sight when he made a start.

Strangely enough, although having so little power the Avro biplane was classed next to scratch, namely 45 m.p.h., whilst Lieut. Snowden-Smith's racing Farman was 40 m.p.h. and Mr. Gilmour's Bristol 35 m.p.h.

On Sunday Lieut. Watkins and Lieut. Park were carrying numerous passengers on Messrs. A. V. Roe and Co.'s Farman biplane.

Monday was very windy, and at 6 p.m. Brooklands "natives" were surprised to see Pixton arrive back from his Brighton tour, having steered his course from Haywards Heath to Brooklands Track in 43 minutes. Missing his way, he had some miles of trees to pass over. The wind was over 20 m.p.h. and he reported having rather a rough time when passing over Dorking.

## Filey School (Blackburn Aeroplane Co.)

ON Sunday the school was early astir, and at 5.30 a.m. Mr. Hucks had the Blackburn "Mercury," fitted with an Isaacson engine, brought out of its hangar. By 6 o'clock all was ready, and in spite of the prevailing winds, he took the air, remaining up some time until the wind began to get rather treacherous, coming from over the cliffs in short gusts. As under such conditions the risks were rather too great Mr. Hucks decided to land.

At 7 o'clock the wind having steadied again somewhat, Mr. Hucks decided to take out the same machine. On this he very successfully made eight flights, several times rising to a height of nearly 200 ft., and covering in all a distance of about 24 miles.

On every occasion the machine rose with perfect grace, and flying steadily and swiftly without a single hitch. In all these flights the 50-60-h.p. Isaacson engine answered splendidly. The delightful weather attracted thousands of people from Scarborough and other seaside resorts around.

No news has come to hand at time of writing, but it was expected that Mr. Weiss's Blériot would be in the air this week.

The school was again early astir on Tuesday. At 6 o'clock in the morning Mr. Hucks, finding the weather very favourable for flight, took out one of the "Mercury" machines. Starting from the aerodrome he flew several times between Filey Bridge and Speeton Cliffs, then around Hunmanby and back to the aerodrome, putting up a flight of 17 miles before alighting. While in the air he made many figures of eight, and ended up with a fine *vol plané*.

It is curious to note how during these flights the seagulls, after circling round the machine, apparently prompted by curiosity to investigate the nature of their mammoth competitor in flight, afterwards give the machine a wide berth, never attempting to again approach it.

### London Aerodrome, Collindale Avenue, Hendon.

**Blériot School.**—Wednesday last week opened brightly, and from 6 to 8 o'clock Messrs. Champion, Henderson, Abercromby, Parr and Seamon indulged in a little practice.

Thursday was a busy day at the school, the pupils being able to put in a good amount of work, Messrs. Champion, Henderson and Salmet making circles while Mr. Abercromby, who is showing very good form in his straight flights, Mr. Dyott, who is coming along very nicely—and by the bye is a Britisher not American as originally stated—and Messrs. Parr, Seamon and Gordon Jones had some very good practice.

Friday saw most of the pupils out early in the morning and late in the afternoon. Mr. Weir, an early pupil who qualified last November, made several good flights on one of the school machines, reaching a height of 300 feet, and also some pretty right-hand turns.

All the pupils were able on Saturday to improve on their previous performances, Mr. Seamon leaving the ground for the first time, this being his fourth time on the machine. Mr. Weir also made several good flights, and on Monday morning Messrs. Abercromby, Seamon and Dyott made a few straight flights before the wind got up.

Several new monoplanes of the latest type arrived at the Blériot School during the week for use in the demonstrations before the War Office delegates and the Members of Parliament yesterday (Friday).

**Grahame-White School.**—At an early hour on Wednesday, May 3rd, operations commenced at the school, Mrs. Martin, with her husband in the passenger seat of the school Gnome-Farman, doing a great deal of rolling and hopping. Travers was flying circuits really well on the newly-erected Farman meanwhile, and when he landed after a quarter of an hour's jaunt, Greswell busied himself giving instruction to Mr. Davis and Capt. Higgins.

The next day, Thursday, was a very full one at the school. It was quite a pity that the flying demonstration before the Parliamentary Aerial Defence Committee had been postponed to Friday of this week, as it was an ideal day in every way, and flying was in progress incessantly from dawn till dusk. Mr. and Mrs. Martin were out first, as on the previous day, making straight flights. At a quarter to six Greswell turned up, and began the morning's tuition by taking up Capt. Higgins and then Davis as passengers. Travers, who has made such rapid progress, was flying circuits very steadily at a height of 200 ft. Capt. Higgins then took the pilot's seat and, with J. V. Martin as passenger-instructor, set off for rolling and straight flying practice. After a good long spell at this practice Mr. Davis was given instruction in a similar way. This method of tuition is really excellent, as pupils can in almost every case get through their course without doing any damage to the machine.

Throughout the afternoon Grahame-White was flying continuously on the "Baby" biplane and the new Farman. On one occasion he took Mr. J. V. Martin as passenger for several circuits of the aerodrome on the "Baby" to demonstrate its good passenger-carrying qualities.

Compton Paterson was also flying the "Baby," often taking it up to 1,500 ft., and making steep *vol planés* to earth. Ridley-Prentice, one of the late pupils at the Grahame-White school, made a very creditable flight during the afternoon, rising to quite 700 ft., and planing to earth in approved style.

On his Gnome-Blériot Greswell climbed to an altitude of 2,000 ft., and flew for half an hour over the country in the neighbourhood of Hendon. Hubert put in a great deal of flying on the Farman aeroplane that Mr. Grahame-White used on his trip to Birmingham. He flew with and without passengers at an average height of 750 ft.

A feature of the day's flying was the bomb dropping by Grahame-White and Paterson. The target was diamond shaped, being 12 ft. at its widest diameter and 8 ft. at its smallest, placed in the centre of a circle of 45 ft. radius.

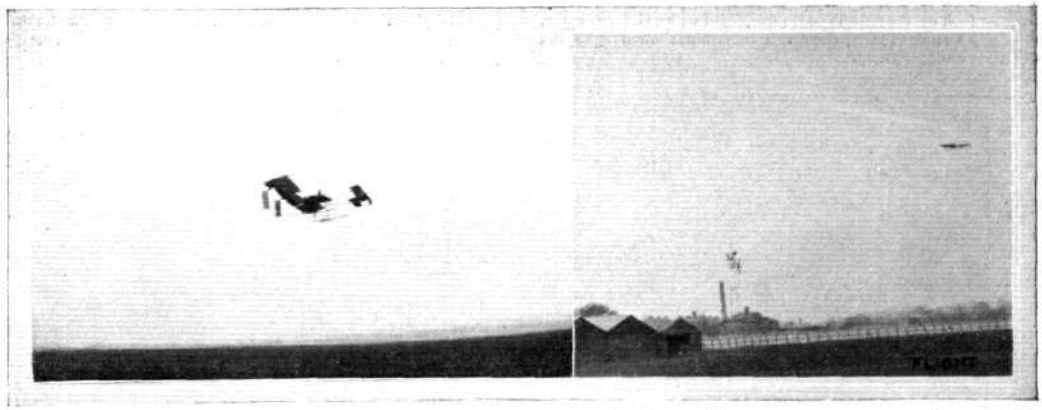
Flying the "Baby" biplane at 200 ft. Grahame-White succeeded in getting five bull's-eyes in five tries, while Paterson, who flew at twice that altitude, scored one bull's-eye, the other four bombs dropping within the large circle. Experiments in weight dropping were also made by Grahame-White.

A 60 lb. sack of sand was suspended from beneath the pilot's seat and dropped by means of a hand-operated releasing gear. Although a 60 lb. sack of sand is a considerable weight to lose suddenly, Mr. Grahame-White found that the effect on the aeroplane was practically negligible.

Maintaining the good progress that he had shown since starting his tuition, Travers proceeded to fly figures of eight, these being accomplished with a good measure of success.

Capt. Higgins and Mr. Davis were taken up alternately by Greswell on the school Farman for flights of 25 mins. duration, and on descent they were allowed to make straight flights. Gustave Raglus was also out rolling on the school Blériot. After a brief interval for breakfast operations were resumed. Both Higgins and Davis were given further experience as passengers by being taken up for extended flights by Hubert, who afterwards flew with a Mr. Hubert Latham. Col. Mackie was another to have a passenger flight, being piloted by Mr. Grahame-White for several laps.

The pupils were out again early on the following morning, Travers, Davis, and Higgins all doing circuits. At 10.15 Greswell mounted the Gnome-Blériot, and climbing to 1,200 ft., went off in the direction of Brooklands. Although it was quite clear when he started, he encountered mist over the River Thames and had to descend to 300 ft., and even at that altitude it was only possible to see a short distance in advance. After flying about for a considerable time in the hope of picking up his route, he descended on a large piece of ground near the Croydon Gas Works. While waiting for assistance, the wind sprang up and for a time he was weatherbound.




**PROGRESS AT HENDON.—The first trials of the new Type B "Valkyrie" cross-country racing machine fitted with Gnome engine. This machine was tried for the first time on Saturday, May 6th, and has exceeded all expectations of its designer. The speed is estimated to be at least 60–70 miles an hour. The machine has a remarkable rising capacity, which leads one to believe that it would be very easy to sacrifice a little of that quality in order to make the machine even still speedier. During the second trial of the machine it made six rounds of the Hendon Aerodrome, during which time, in order to keep the machine from rising above 200 ft. high, the pilot had to make over twenty *vol plane* descents. This machine carries a passenger easily, and is specially designed for fast cross-country work and military service.**

Flying was, nevertheless, in progress at Hendon, Mr. Grahame-White being kept busy giving "joy rides" to several of his friends.

At about 5.45 a speck appeared in the sky to the S.E. which gradually resolved itself into No. 10 Gnome-Blériot with Greswell aboard. On his descent he made three flights on the school Farman with passengers before finally retiring.

Sunday, the 7th, was another very busy day in the air. After a preliminary solo flight Hubert gave a passenger flight to Dr. Yamei Kin, who is, we believe, the only native Chinese lady who has qualified for her M.D. degree in England. Among the passengers that Mr. Grahame-White took up during the day were Mr. Arthur Du Cros, M.P., and his young niece. Capt. Higgins and Mr. Davis put in good work on the school Farman, doing circuits at about 150 ft., while Travers devoted his attention to the *vol plané*, making several from a height of 200 ft. Grahame-White resumed his weight-dropping tests, this time increasing the weight to 100 lbs. Still, however, there was practically no effect on the machine when the weight was released. Hubert made a fine flight with Capt. Sykes as passenger. Leaving the aerodrome he flew over Harrow, and returned to the aerodrome at an altitude of quite 1,200 ft. The flight terminated with a spiral glide to earth. For the first time since quite early in the year, Grahame-White went out on his Gnome-Blériot, and made a very pretty flight of half a dozen laps of the ground, eventually planing to earth.

Armstrong Drexel, an old Grahame-White pupil of the time when the school was in operation at Pau, in the South of France, had paid a visit to the aerodrome, and at his late instructor's invitation took out the latter's Gnome-Blériot and flew with all his old skill.

**Valkyrie School.**—The Valkyrie pupils, who are nothing if not enthusiastic, started work at 4 a.m. on Thursday last week. Miss Meeze had her second lesson and made good progress. Mr. Turner and also Mr. Perry each had their second lesson, and both made straight flights, Mr. Perry making his essay after only 35 minutes rolling practice. The school instructor was out on "Valkyrie II" and put in some useful flying, carrying several passengers. The wind rising at 7.30 put an end to air work.

The weather moderating later, the school machine was out again at half past five, where Miss Meeze, Mr. Chambers, and Mr. Turner were all hard at it again, the last two specially improving in their flying. Mr. Turner, unfortunately, had a slight mishap, doing some damage to the school machine. It was, however, unimportant, and the machine should be in commission again in a day or two. The school pilot took out the new Type A VII machine, and put up some remarkable demonstrations, during which he made turns with his hands above his head. One flight lasted for half an hour, during which the machine flew over the surrounding country. Dr. Lightstone and Mr. Davis had passenger flights.

On Friday the Valkyrie designer had No. VII out at 5 a.m., and made a very fine cross-country flight of 20 minutes' duration, passing near Harrow. Returning to the aerodrome, he ascended to a considerable height, and put up a steady flight of some 40 minutes, although during part of the time there was quite a breeze blowing.

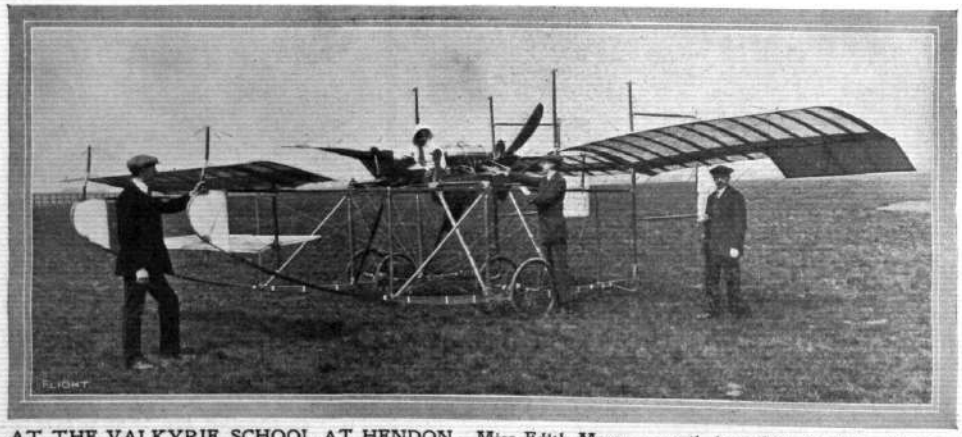
The next day proved too windy for pupils, but the Valkyrie designer took out the new Type B racer, fitted with a Gnome engine, and made a series of pretty flights. The machine showed high speed and great lifting capacity.

Early in the morning of Sunday the Type B racing machine was out again, and made a fine flight of about twelve miles, during which the pilot indulged in numerous *vol plané* descents from a height of several hundred feet, and executed some sharp turns. This machine has shaped very well in practice, exceeding all expectations regarding speed and lifting capacity.

**Salisbury Plain.**

WEDNESDAY of last week brought a welcome change in the weather, and Mr. Pizzy made an early start instructing pupils, at the Bristol School, being quickly followed by M. Jullerot. At his second attempt Mr. Hotchkiss made a very satisfactory flight, while Mr. Philpot, another pupil, was flying about 100 ft. high, and after making a couple of circuits of the Camp, landed in fine style. Thursday morning was too windy for the pupils to venture out, but in the afternoon Mr. Philpot was flying at a height of 500 ft. and completed half the tests to obtain his certificate. Among the other pupils who were practising were Capt. Massy. On the following morning Mr. Philpot completed his certificate tests, and Capt. Massy then got into the machine to make his test flights. In landing, during one of these, the machine came down a little heavily, resulting in damage to the propeller and the skid. This was soon put right and Capt. Massy then successfully completed the tests, thus making a second brevet won that morning. M. Jullerot, during the morning, indulged in a fine flight round Shrewton, Stonehenge, Amesbury, Bulford Camp, Durrington, and back to the hangar, flying at a height of 1,000 ft. and finishing with a fine *vol plané*. In the afternoon Mr. Pizzy was also flying on the Bristol extension biplane at an altitude of 1,200 ft.

On Saturday the flying ground was visited by a large number of members of the Bristol and West of England Aero Club, and M. Jullerot, Mr. Pizzy and Mr. Fleming each made very fine flights and also carried some of the visitors for short trips. In the afternoon Mr. Hotchkiss was flying, and after covering a circuit of two miles he was steering for land in front of the hangar, when he found that the spectators who had strayed away from the sheds made it almost impossible for him to alight. Realising the position, he quickly rose again, and, handling his machine in masterly fashion, cleared the telegraph wires bordering the ground. By the coolness and confidence displayed by this pilot he would appear to be one of the most promising of British flyers. The outdoor work for the day was finished by Mr. Fleming making a very fine flight, which concluded with an impressive *vol plané*. A little flying was indulged in on Sunday evening by Messrs. Jullerot, Pizzy, and Fleming. On Monday the weather was again fine, the pupils being out early, Mr. Pizzy taking a new pupil round the camps and then on to Salisbury, where they flew round the Cathedral, flying back to headquarters, *viâ* Amesbury and Bulford Camp, at a height of 2,000 ft. Mr. Fleming then took up one of the mechanics, Mr. H. H. Bannister, for a trip at a height of 1,200 ft. round the camps and Amesbury, ending by a long gliding flight. During the afternoon a visit was paid to the flying ground by Mr. Stanley White, Capt. Dickson, and Mr. Bennett Burleigh, they witnessing some good work by Messrs. Pizzy, Jullerot, and Fleming.



**AT THE VALKYRIE SCHOOL AT HENDON.—Miss Edith Meeze, a pupil, just about to start. Reading from left to right: Barnes, the engineer-in-charge at the Valkyrie School, Miss Meeze, the School Instructor, and Mr. Harris, Works Manager.**

# FOREIGN AVIATION NEWS.

### The New Voisin "Canard."

THE success obtained with the "Canard" machine has induced the Voisin firm to make it a standard model, and the first of these new machines has recently commenced its tests at Issy The general design follows that of the original experimental "Canard" except that the construction is of steel tubing like the other latest Voisin models. The two mudguard-like planes at the forward end of the machine have now been dispensed with while panels have been fitted between the extremities of the main planes. The system of double control which is fitted to the Voisin military biplane has been adapted to this machine, in which the pilot and passenger sit one behind the other instead of side by side. Another detail is a starting handle which has been arranged just behind the passenger seat, thus permitting the engine to be started from the machine. The main plane is built up in three sections and the end sections can be taken off and packed on the machine, when the biplane can be driven along the road. To test this feature of the machine it was so arranged and driven from the works at Billancourt to Issy, and although the distance is not very great yet the road is a difficult one to negotiate. Piloted by M. Gabriel Voisin the machine, however, completed its task without any untoward incident. As soon as this machine has completed its tests on land it is to be equipped with floats and tested on the Seine at Billancourt. The biplane, which is of 10 metres span, is fitted with a 70-h.p. Gnome engine driving a Voisin all-metal propeller.

### Henry Farman's Monoplane.

ON Saturday last Mr. Henry Farman had a new monoplane out at Bouy, and covered a distance of about 15 kiloms. at his first attempt. During a *vol plané* from a height of 20 metres the machine appeared to be remarkably stable, and also it showed itself to be capable of a high turn of speed. On Sunday he was carrying a passenger, but the speed was in the region of 100 k.p.h.

### An Aerial Direction Sign.

WITH a view to assisting the competitors in the European Circuit a proposal is on foot to lay down on the open ground near Calais a great direction indicator. It will be in the form of an arrow, 600 ft. long, with a shaft 10 ft. wide, and will be formed of blocks of chalk set in the grass.

### Leon Morane in the Air Again.

UNABLE to resist the temptation during a visit this week to his new aerodrome at Vidamee, close to Chantilly, Leon Morane climbed into one of his machines to adjust the motor. Then, in spite of the fact that he found some difficulty in steering, owing to his right leg being shorter than the left as a result of his accident last year, while his knee is also very stiff, he made a satisfactory flight at a height of about 100 metres, and on landing expressed a wish that he might be able to take part in the chief flying competitions of this year.

### Maurice Farman takes his Father for a Cross-country Trip.

USING one of his military type biplanes, Mr. Maurice Farman carried his father from Buc to Etampes on the 5th inst. and returned with him to Buc on the following day. The distance *via* Rambouillet is 80 kiloms., and on the outward journey the time occupied was one minute over the hour, while when returning an hour and a half was necessary for the trip, but then the aviators had to fight against a variable breeze which at times was blowing at 12 metres a second. On the 4th Henry Farman was carrying his brother Dick at Mourmelon.

### "Pierre Marie" carries his Mother for a Trip.

FASCINATED by the way in which her son manipulates his Deperdussin monoplane, the mother of "Pierre Marie" induced him to take her for a trip in the central blue on the 4th inst. Rising from the Betheny aerodrome, the machine was steered over Rheims and the surrounding country at a height of 100 metres, and on landing, by means of a *vol plané*, Mme. "Pierre Marie" expressed herself as having been greatly charmed by her experience.

### A Long Flight at Issy.

RISING from Issy at 22 mins. past five on the morning of the 2nd inst., Archimede Luzetti on his Anzani-engined Blériot made 89 circuits of the Issy parade ground in 1 hr. 58 mins. On landing at 22 mins. past seven, owing to the petrol giving out, he was informed that he would be reported for flying beyond the regulation hours.

### From Pau to Eauze.

HAVING been engaged to give a series of exhibition flights at Eauze on Tuesday and Wednesday last, Gaget determined to fly there from Pau. He accordingly started away in his Morane monoplane on Sunday morning, covering the 92 kiloms. in 52 minutes.

### From Buc to Orleans.

HAVING made arrangements to take part in the Jeanne d'Arc Fêtes at Orleans on the 6th inst., Barra selected the air way from Buc, where he had been practising on his aeroplane. He left Buc at twenty minutes to six on the 5th inst., and landed safely at the Cercottes flying ground at Orleans at exactly seven o'clock.

### A Sommer School at Issy.

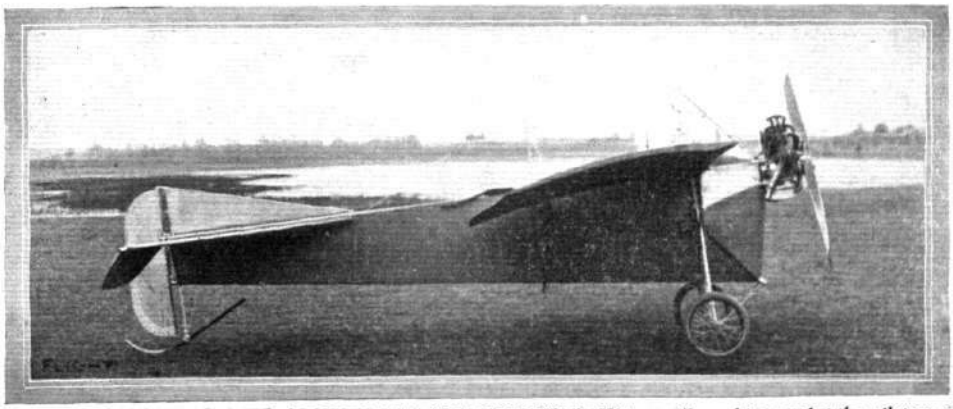
M. SOMMER has decided to start a school at Issy, and already two of his latest military-type machines have been sent there. M. Martin has been appointed chief pilot of the school, and in addition to teaching, it is intended that demonstration flights shall be made occasionally.

### Paying Calls by Aeroplane.

LEAVING his flying ground, La Bouteille, by Vervins, at 9 a.m. on the 2nd inst., Duflot first flew over to Caudry to see a friend and then continued on to St. Quentin, where he spent some time with some other friends. Late in the afternoon he once more mounted his machine and returned to his headquarters at Vervins.

### An Accident at Issy.

THROUGH failing to observe some telegraph wires M. Raymond See met with a serious accident while practising on his Voisin-Canard at Issy on Monday morning. He had made a couple of



**THE LATEST R.E.P. RACING MONOPLANE, "LE POUSSIN."—This small machine, under the pilotage of Amerigo, is credited with a speed of 107 kiloms. an hour.**

circuits of the ground and was passing over a tall house when the chassis of his machine caught a telegraph post mounted on the roof of the house. This brought the biplane down with a run and it fell with a crash on to the roof of an adjoining shed. Fortunately help was close at hand, and M. See, very badly injured, was at once rescued from the roof and taken to the hospital, where the latest reports state that he is doing as well as can be expected.

### Andre Has a Stroke of Ill Luck.

AT the conclusion of his flight from Mar del Plata to Buenos Aires, a distance of 400 kiloms., the aviator Andre met with a most unfortunate piece of bad luck. During the night a cyclone sprang up and blew down the hangar containing his Henry Farman machine, with the result that the balance was smashed beyond hope of repair. With a prize of £2,000 won by this long cross-country flight the aviator is returning to France with the object of obtaining a new machine.

### The Paris-Bordeaux-Paris Event.

As the date fixed upon for the Paris-Bordeaux event of the Aero Club of France—the first fortnight in July—is not acceptable to the authorities at Pau and Toulouse, it has been decided to drop the question of continuing the journey from Bordeaux to these two places. The competition will therefore consist simply of the race from Paris to Bordeaux and back.

### Ae.C.F. Offer Medals.

THE Committee of the Aero Club of France has decided to award its medal to the winners of the chief events of 1911, these including the Paris-Madrid race, the Paris-Rome race, the European Circuit, and the Paris-Bordeaux-Paris event.

### Another Prize for the Paris-Madrid Race.

THE list of prizes to be awarded in connection with the Paris-Madrid race has received a notable addition in the form of an *objet d'art* valued at £200 presented by M. Deutsch de la Meurthe for the first aviator to arrive in Madrid.

### The French Military Pilots.

THE number of French military officers to qualify for the special army pilot certificate is steadily mounting up, and hardly a day passes but some new officer flies the 100 kiloms. across country. On the 2nd inst. Lieut. Blard, on his Henry Farman biplane, carried out the test at Mourmelon ; on the 4th inst. Lieut. Gaubert and Capts. Felix and Delajoux, each on a Blériot monoplane, did the same at Pau ; while on the 6th Lieut. Clavenad qualified at Vincennes on a Blériot, and Capt. Chaunac at Buc on an R.E.P. monoplane.

### The Amsterdam Flying Week.

THE exhibition flights of Legagneux on his Blériot and Marcel Hanriot on his Hanriot monoplane at Amsterdam were continued on the last days of the past week and some very good flying was seen, while the lighter-than-air type of craft was represented by "Parseval V," which on the 5th inst. made an excursion carrying two delegates of the Minister of War to the Hague. On Monday Legagneux and Hanriot flew over to Soestorberg where they were to give exhibition flights during this week.

### Hanriot Monoplanes in Germany.

IN view of the various cross-country and circuit competitions which are being organised in Germany special attention is being paid to the monoplane type of machine. The Aviatic firm have purchased the Hanriot patents in Germany and one of these machines is to be piloted by Jeannin in the South German circuit.

### Cross-Country Flying in Austria.

THREE Austrian pilots indulged in a town-to-town race on the 3rd inst., the course being from Vienna to Oldenburg and back. The first place was secured by Col. Umlauff, who covered the 70 kiloms. in 41 minutes. Lieut. Miller was second in 46 minutes, while Lieut. Bier took third place with 48 minutes.

### From Sweden to Denmark.

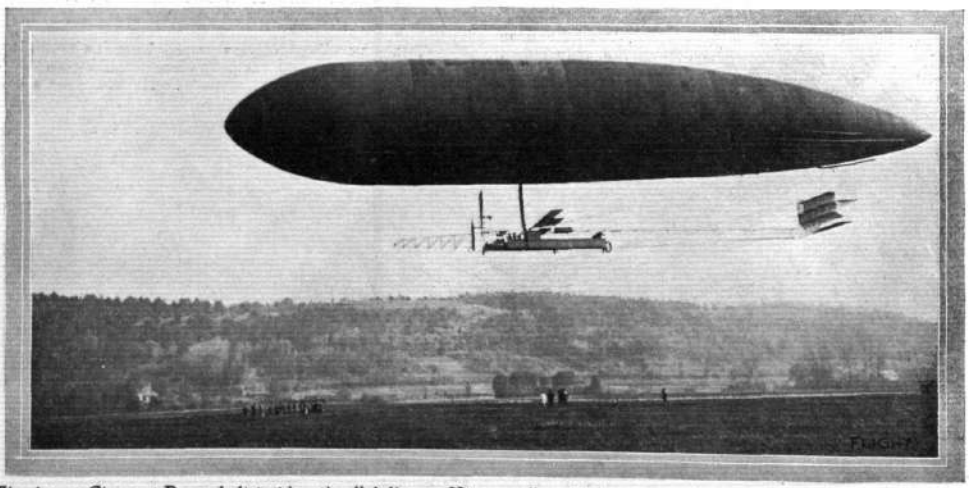
IT will be remembered that last year several aviators succeeded in flying from Sweden to Denmark or *vice versa*, and it would appear that this trip is likely to be a popular feat this year. On Sunday afternoon the Belgian aviator Cozic, on a biplane which he has built himself, flew from Malmoe to Copenhagen in Sweden in 45 minutes. In the morning M. Poulain made one or two satisfactory trial flights on a monoplane with which he successfully experimented at Issy some time ago.

### Fatal Accident to Vallon.

THE unfortunate accident which ended in the death of Vallon at Shanghai on Saturday last has robbed the Sommer School of one of its best biplane pilots. During the past three months he had been giving exhibition flights in China, and hoped to be back in France shortly in order to take part in the various big events. It was while giving an exhibition flight over the Kiangwan racecourse, near Shanghai, that the aeroplane suddenly plunged to earth from a height of 200 metres. The aviator was killed instantly, and at present it is impossible to assign any cause for the accident.

### "Clement-Bayard IV." off the Stocks.

AT last the new dirigible built by M. Clement has made its appearance in the open. In general appearance it resembles the Clement-Bayard airship which sailed from France to London last autumn, and it has a similar system of steering planes and rudders at the rear. At its first trial on the 6th inst. it cruised over the neighbourhood of La Motte Breuil for 25 mins. with M. Sabatier and four mecaniciens on board, while on the following day it was aloft for some time with M. Clement and a military officer as well as other passengers on board. In landing, the airship came in contact with some telegraphic wire, but no great damage was done.



**The latest Clement-Bayard dirigible—the "Adjutant-Vincenot"—which was tried at Lamotte-Breuil for the first time on Saturday last, and which has been constructed for the French Army. The envelope has a capacity of 9,000 cubic metres, and the two Bayard-Clement motors are of 120-h.p. each. She is constructed to carry a useful load of 3,500 kilogs.**

FLIGHT

# ATMOSPHERIC FRICTION.

By A. F. ZAHM.

(*Continued from page* 405.)

SUCH were the results obtained in a wind of uniform velocity and direction. When, however, the current is turbulent $a$ and $n$ are found to vary considerably; but since the flow of a turbulent wind cannot be specified, the measurements obtained in one such current cannot well be applied to determine the resistance in a *different* one. For that reason it seemed better to make the measurements in a uniform wind, where, moreover, the instruments give steadier readings.

On comparing the above results with those obtained by Dr. Froude for water, it is found that the equations are very similar. The exponents are nearly the same, and the coefficients are to each other roughly as the densities of air and water. Using varnished friction-boards, Froude finds $n = 1{\cdot}85$ for a surface 8 ft. to 20 ft. long, and $n = 2{\cdot}00$ for a plane 2 ft. long; I find $n = 1{\cdot}85$ for all lengths from 2 ft. to 16 ft. By Froude's measurements the friction varies as the power 0·83 of the length for varnished planes 2 ft. to 20 ft. long; I find it to vary as the power 0·93. With a varnished board 2 ft. long, moving 10 ft. a second, the ratio of our coefficients of friction for air and water is 1·08 times the ratio of the densities of those media under the conditions of the experiment.

But in some respects Froude's results are quite unlike mine. For several surfaces he finds the skin-friction to vary as the square of the velocity, or nearly so, which is the relation I observed in a turbulent current and when the friction-board was vibrating slightly. He finds the friction of calico about twice that of a varnished surface; I find that glazed cambric has about the same friction as a varnished surface; but if the cambric is roughened, so as to expose a fine down, the friction is very much increased.

The fact that for some surfaces the coefficients of friction for air and water are roughly as their densities is of considerable interest. It is well known that the head resistances of the two fluids are directly as their densities, and if their friction coefficients also bear that ratio, the total resistances must be approximately as the densities. Hence the data obtained from water-resistance measurements on such surfaces may be fairly well applied to estimate the air resistance on various shaped models.

It is not, however, self-evident that the surface friction of any two fluids is proportional to their densities, and should not be taken for granted. It happens to be roughly true for varnished wooden surfaces in air and water, but appears to be wholly untrue for calico surfaces. In default, therefore, of an adequate physical theory of surface friction the magnitude in any given case can be determined only by direct experiment.

To complete the theory of the skin-friction board two steps further remain to be taken. First, the equations of motion for a viscous fluid must be integrated to find the velocity at all points in the disturbed region about a thin material plane. Then the speed of flow must be measured at all points next the plane, and at some distance away. The writer expects soon to map the stream-lines, and measure the velocity. If, then, the equations can be integrated so as to give the speed as a function of the space co-ordinates, the computed and observed values can be directly compared. It is hoped that some one may obtain sufficiently general solutions of the equations to be of practical value, particularly for the simpler case in which the plane is indefinitely wide, and in which the edge conditions are negligible. The integrals, if sufficiently general, will be of great importance to the science of surface friction, and may at once be applied to the mass of accurate data that for a generation has been accumulating in the laboratories of marine engineers.

## Applications.

The laws of skin-friction have both theoretical and practical application. They serve theory by explaining some apparently anomalous phenomena, and by leading to more complete formulæ for total resistance. They are of practical use, because in many of the forms employed in transportation the skin-friction is a large part of the total resistance.

It has been the common practice of writers on air resistance to employ the Newtonian formula, $R = av^2$, in which $a$ is regarded as constant for a surface of fixed form and aspect; but this equation is far from true (1) for blunt bodies moving at high speeds, and (2) for bodies of easy shape moving at moderate speeds.

For blunt bodies at speeds below 1,400 ft. a second the resistance is expressed more accurately by the equation $R = av^2 + bv^3$, in which $a$ and $b$ are constants. This has been shown analytically by Duchemin,* and has been proved experimentally by the writer† for speeds below 1,000 ft. a second. It was also corroborated by Duchemin by citations from the experiment of others.

For bodies of easy shape and moderate speed the co-efficient $a$ in the Newtonian formula gradually diminishes with the velocity. This was observed by Langley and Canovetti, and now one reason seems apparent. The resistance cannot vary as the square of the velocity because a large part of it is friction, which varies as a lower power.

A good general formula may be obtained by writing the total resistance as the sum of two terms, one giving the head resistance proper, the other the skin-friction. Thus for ordinary transportation speeds we have $R = av^2 + bv^{1{\cdot}85}$, in which the body constants, $a$ and $b$, are each a function of the dimensions and aspect of the given figure. A like formula may be used for a family of figures.

As an example of the influence of the friction term, let it be required to find the resistance per unit length of a post having the form of cross-section shown in Fig. 6. The head resistance proper may be written equal to that of the major section, taken normal to the velocity multiplied by the sign of half the angle of the edge of the post. Thus $R_1 = c \sin \alpha$, in which $c$ is the resistance of the major section and $\alpha$ is the angle $abd$. Again, the skin-friction resolved parallel to the velocity is

$$R_2 = 2\int f_s\, ds \cdot \frac{dx}{ds} = 2\int f_s\, dx,$$

in which $f_s$ is the co-efficient of friction for the element of surface, and $dx$ is an element of the width $ab$. Hence the total resistance may be written $R = c \sin \alpha + 2fx$, in which $f$ is the average friction per unit surface.

**Fig. 6.—Symmetrical ogival wedge of minimum resistance.**

A glance at the above equation reveals its chief features. For $x$ equal to zero, the second term vanishes, and the first becomes $R = c$, which is the normal resistance of the major section. For $x$ very large the first term is negligible, and there remains $R = 2fx$, which is the formula for a simple plane moving edgewise. Thus the total resistance is comparatively large when $x$ equals zero: then becomes smaller and smaller till a minimum is reached, and finally continuously larger as $x$ goes on increasing. The width giving a minimum resistance is, of course, obtained by placing the derivative of R equal to zero and solving for $x$.

What has been said of this particular shape is true of all the figures of a family in which the major cross-section is kept constant while the length varies. There is some length for which the resistance is a minimum, and beyond that the resistance increases with the length up to infinity. To illustrate these features, let the equation for the total resistance be applied to the data of an experiment.

For practical engineering purposes, which need not be detailed here, it was found desirable to measure the total resistance of a number of wedge forms such as shown in Fig. 6. The models are all 1 in. thick and of the widths given in the second column of Table V. The size of the models is given in the first column as so many calibres, their outlines being circular arcs whose radii are an even number of times the thickness of the wedge. The actual measured values of the resistance per unit length of post at 10 ft. a second are given in the last column of the accompanying table, and shown diagrammatically in Fig. 7 by the little circles.

TABLE V.—*Computed and Observed Resistances of Duangular Cylinders 1 in. thick, 1 ft. long, and of Various Widths.*

| Calibre of Model. | Width of Model. | Computed Resistance. Head. | Frictional. | Total. | Observed Resistance. |
|---|---|---|---|---|---|
| 1 | 1·76 | 0·00687 | 0·00021 | 0·00708 | 0·00702 |
| 5 | 4·41 | 0·00307 | 0·00051 | 0·00358 | 0·00375 |
| 10 | 6·20 | 0·00221 | 0·00069 | 0·00290 | 0·00298 |
| 20 | 8·88 | 0·00155 | 0·00096 | 0·00251 | 0·00267 |
| 30 | 11·05 | 0·00125 | 0·00118 | 0·00243 | 0·00250 |
| 40 | 12·77 | 0·00108 | 0·00135 | 0·00243 | 0·00238 |
| 50 | 14·31 | 0·00097 | 0·00150 | 0·00247 | 0·00235 |
| 60 | 16·00 | 0·00087 | 0·00166 | 0·00253 | 0·00253 |
| 70 | 16·87 | 0·00082 | 0·00175 | 0·00257 | 0·00253 |
| 80 | 18·25 | 0·00077 | 0·00188 | 0·00266 | 0·00261 |
| 100 | 20·12 | 0·00069 | 0·00206 | 0·00275 | 0·00285 |
| 150 | 24·87 | 0·00056 | 0·00250 | 0·00306 | 0·00299 |

* "Les Lois de la Resistance de l'Air."

† "Resistance of the air at speeds below one thousand feet a second," "Philosophical Magazine," May, 1901.

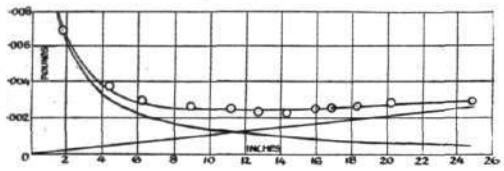



**Fig. 7.—Computed and observed resistances of symmetrical wedges.**

Now let us apply to these data the equation $R = c \sin \alpha + 2fx$. Taking $c$ = 0·0139 lb., the normal resistance of the major section at 10 ft. a second, as computed by Langley's coefficient; also $\sin \alpha = 1/\sqrt{1+x^2}$, $x$ being inches; and $2f = 0{\cdot}0001263\, x^{-0{\cdot}07}$, the numerical equation becomes $R = \frac{0{\cdot}0139}{\sqrt{1+x^2}} + 0{\cdot}0001263\, x^{\cdot 93}$. The values obtained by substituting for $x$ the various widths of the models are given in the table and shown by means of the curves in Fig. 7.

The diagram portrays the main features of the equation very clearly. The total resistance falls rapidly at first, becomes a minimum when the wedge is about 1 ft. wide, then increases indefinitely with the width. The true head resistance and the skin-friction, as shown by the lower curves, approach each other, becoming equal when the width of the wedge is a little below 1 ft., then diverge indefinitely, the friction being four times the true head resistance when the width of the wedge becomes 2 ft.

We have thus found a formula which accords very well with the data of experiment; but its first term expresses only approximately the true head resistance and is here employed merely tentatively. In fact, the coefficient $f$ had to be somewhat increased to make the computed and observed values agree. Thus the term 0·000126$x$ makes the skin-friction equal to 0·00127 of a lb., when $x$ equals 1 ft., whereas by Table IV it should be 0·00113. So probably the term $c \sin \alpha$ gives values for the head resistance which are somewhat too small. Possibly, also, the values of $f$ given in Table IV for short planes should be slightly increased.

*(To be concluded.)*

# CORRESPONDENCE.

**** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

**Correspondents communicating with regard to letters which they have read in FLIGHT, would much facilitate ready reference by quoting the number of each such letter.**

NOTE.—*Owing to the great mass of valuable and interesting correspondence which we receive, immediate publication is impossible, but each letter will appear practically in sequence and at the earliest possible moment.*

## The Kny-Plane.

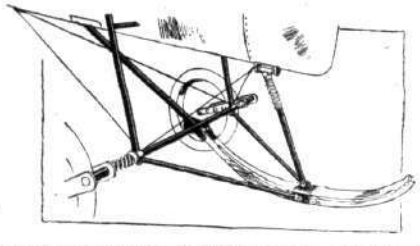
[1168] Looking through the April 29th issue of your valuable paper we find that you omitted in your sketch of the undercarriage of the Kny-plane an important member of the chassis.

As, in consequence, you remark in your description on the same page that a "very massive" piece of "timber," which up to the present day we notice you always called a "skid," is hinged in a rather "light manner" to the axle, we should feel obliged to you for rectifying your misstatements and sketch. The simple spring adjusters are not shown, and the torsion springs should be larger.

We attach great importance to everything said or shown in a technical paper of such importance as yours.

MULLINER, LTD.

Aeroplane Works, Vardens Road, Clapham Junction.



[We publish herewith our original sketch, with the corrections as named by Messrs. Mulliner.—ED.]

## Steering by Compass.

[1169] Having seen several articles relating to the above heading in FLIGHT, I should like to state my views on the matter. Mr. Graham Davies gives some excellent methods of steering an aeroplane to a desired course through the air, but which are necessarily rather a tedious process to the pilot. The difficulties of aerial navigation at the present time are, as far as I can ascertain, due to the following causes:—In the first place the ordinary compass is of very little use to the pilot of an aeroplane, because it only indicates the direction in which the machine is heading.

When a machine is blown out of its course by side winds the compass only indicates this to a certain extent if the heading of the machine is affected, because the direction is told by the centre line of the machine in its relation to the compass needle. Now in this case the pilot can see that the machine is heading from the direction in which he desires to travel, so that he heads the machine into the right direction again. Now before considering this would appear to be all that was required, but a moment's thought will show that the pilot by heading his machine in the desired direction has only corrected the amount of drift to a very little extent—the machine would be still drifting sideways with the wind. The resultant of the drift wind and the power driving the machine is a crab-like motion of the machine through the air, of which motion we can gain no information from the compass, because the machine will be still heading in the desired direction, although drifting with the wind.

After considering these difficulties it occurred to me that, supposing the pilot of an aeroplane could tell in what direction his machine was moving through the air, could he not then make the direction through the air coincide with the direction required by the compass by heading his machine round to counteract the drift?

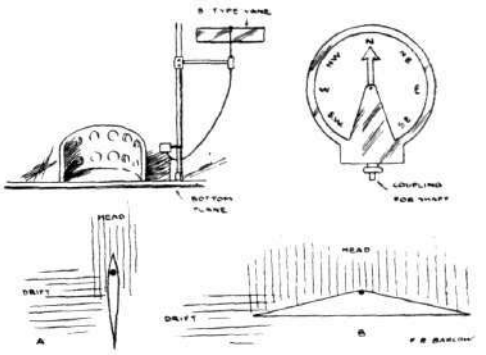
I venture to think that this is quite possible, and I propose to describe a method by which the above might be accomplished.

Now first we must find a means of telling the direction of the machine through the air. This can be accomplished by taking into consideration that if a machine be moving through the air, the head wind set up by the speed of the machine's flight will be striking the machine according to the angle at which it is travelling. A small vane fixed on the machine so that it could set itself in the stream line of the head wind will give us the direction of the machine's flight through the air.

An indicating instrument somewhat on the following lines might be used. A compass of the most approved type for aeroplane work, consisting of one part, an indicating pointer and mechanism actuated by the vane of the other, the pointer being situated above the compass card and operated by a length of flexible shaft from the vane which could be fixed on a bracket clamped to one of the struts, as shown in Fig. 1. The working of the instrument, of which Fig. 2 will give some idea, is as follows:—The indicating needle being operated by the vane shows the direction of the machine's flight through the air by pointing to the degrees on the compass card, and shows at a glance the direction in which the machine is travelling from a desired course, the machine being headed round until the pointer rests over the degree on the compass card in which it is desired to travel and kept

there, the pilot being able to keep a straight course regardless of fogs, &c.

Of course the drift wind will have an effect on the vane and cause it to read inaccurately, but no doubt a vane could be so designed to present more surface to the head wind than to the drift wind. Fig. 3 shows two types of vanes, A being




a single vane showing the winds striking its surfaces and causing inaccurate readings; B shows a more efficient vane, having more surface presented to the head wind than to the drift.

I trust that the above will be of interest to the readers of FLIGHT, and that it will lead to further investigations along these lines.

F. R. BARLOW.

212, Sussex Road, Southport.

[1170] In my letter (1165) published this week, "The ratio *of* inertia *of* resistance" should read "ratio of inertia *to* resistance"; also, "to set the aeroplane drifting at the wind" should be "at the speed of the wind."

L. GRAHAM DAVIES.

[1171] From the numerous letters now appearing in FLIGHT it is evident that the subject of instruments for aerial navigation is receiving great attention. Messrs. Elliott Bros. say that a magnetic compass properly adjusted and compensated so as to be unaffected by the iron and steel portions of an aeroplane should be a properly serviceable instrument. In this I quite agree, provided that a suitable compass is used (an ordinary marine type is not suitable) and that it is properly suspended so as to be free from the engine vibrations, shocks when running over rough ground, and bumps when landing. It is true that the compass will not have to be looked at whilst rolling or landing, but it must not be forgotten that a really high-class instrument has its card supported on an iridium point bearing in a jewelled centre and that the least jar tends to injure the point and cause a certain amount of friction, and so to prevent the free movement of the compass card. The mere fact of leaving the card always on its centres is sufficient in time to deteriorate the bearings, and for this reason, most "dry" compasses are arranged so that the card can be lifted when not in use. Up to the present this has been difficult to do in liquid compasses, which are the only type that can be used on an aeroplane, but an arrangement of my own now gets over this difficulty, the result being that a high standard of perfection can be maintained.

As for the suspension, your correspondent C.O. suggests that the compass bowl should be placed in a box packed with horsehair; whilst this may be perfectly successful under some conditions I think it will be found unsuitable under hard continuous use, especially taking into account the running on the ground previous to flight and the alighting, though if the compass card were held off its points during these periods it would greatly assist matters. With reference to the question of gimballing, I again rather differ from your correspondent. An aeroplane, if it is making a *vol plané* from say 5,000 ft. on a misty day would certainly require to use the compass, but as the gliding angle is probably 1 : 4, it would be impossible to prevent the card sticking unless it were kept moderately horizontal. Of course, if the bowl were deep enough, the card might have considerable movement arranged for it, but even then the centre must be getting out of its best position, and the balancing wrong. There is also the question of side motion (rolling), although this is not so serious. The weight of the gimballing is only a few ounces, whereas making the bowl deep enough to allow the card to swing even at an angle of 1 : 10 would be considerably heavier.

I have tested different types of machines, and my experience leads me to think that gimballing is absolutely essential. Anyhow, I have never yet been able to read a compass correctly when making a *vol plané*, unless it has been so fitted. As far as I am aware, I am the only man in England who has seriously attempted to adjust a compass on an aeroplane for deviation, both swinging it on the ground and afterwards in the air, where, of course, the conditions may alter very considerably. So far, I have not met a machine that cannot carry a compass with satisfactory results, provided the makers of certain of them will make their control levers of non-magnetic material. The Howard Wright machine mentioned by your correspondent would have been a practically impossible machine to adjust, and I am pleased to hear that the levers, &c., are to be altered, as, from my point of view, this was the one defect in that excellent machine.

Most of the compasses I have so far fitted have been on their worst positions, as much as 1½ points out, which would approximately mean that if no correction were made, in a flight of 60 miles the machine would be 18 miles off its course.

The method of correcting this error is the same as is used on a ship, that is, by magnets and soft iron bars or balls; but it is rarely that a compass can be adjusted absolutely true on all points, but what little error remains is generally negligible. If very exact results are required, a table of deviation is supplied.

There are two points that none of your correspondents seem to have touched upon up to the present. The first is, that the magnetic compass does not point true north, but points in the eastern part of England about 15° W. of true north. Of course, anyone who has ever had anything to do with a compass knows this; but the average aviator does not, and until he grasps this point a compass is worse than useless to him. The amount of this difference between the true north and magnetic north (variation) varies in different parts of the world. The second point is that it is extremely difficult for anyone who is not continuously using a compass to remember its various points, ½ points, and ¼ points. My experience is that if you tell an aviator to steer say N. by W. ¾W., within two or three minutes he may be steering N.N.W.½ W., or in fact any course but the right one, simply because, as he explains, he has forgotten how many "black spots" of W. there were. A black division more or less means very little to him when his attention is fully taken up with other matters.

To get over this difficulty I have designed a movable pointer attached to the compass card which can be rotated to any required course. It remains pointing to this course until a new one is desired, when it can be reset in a moment. This arrangement also allows an illuminating device to be fitted. When steering the desired course a white light appears, when off the course to the left, a red light shows, and when off to the right, a green. The same fitting enables the card to be lifted off its centre when not in use.

The question of drift is of great importance but I feel I have occupied sufficient space with this letter but hope to return to the subject later.

Kensington, W. E. HOLLOCOOMBE CLIFT.

[1172] I notice a good deal of correspondence in your last issue of FLIGHT with reference to compasses. It may interest you to know that both in my flight to Brighton and back last Saturday, and on my previous flight there and back, I used one of Mr. E. H. Clift's patent compasses with the best of results. It is absolutely steady under all conditions, even in a gusty breeze, when my Blériot was tossed about considerably.

I was able to verify the working of the compass from time to time by the accuracy with which I picked up known objects. The aeroplane was swung in what I understand is the same manner as a ship, and though rather a long job is well worth the trouble, and Mr. Clift should be congratulated on having entirely solved the compass difficulty. The patent suspension evidently does all that is required, and the course-keeper pointer is invaluable.

G. W. HAMEL.

## The Aerocar.

[1173] In your issue of March 18th I notice an account of a paddle-wheel apparatus constructed by Mr. J. Clarkson, which he calls an "aerocar." On reading the account one would presume that the machine was the first of its kind and the first to be called an aerocar, but I personally assisted in the construction of a paddle-wheel machine which was designated "aerocar" some four years ago. The machine was on the feathering plane principle, as is Mr. Clarkson's.

Camborne. W. SCUNDLING.

# MODELS.

## Miniature Models.

[1174] In answer to Mr. Bishop's letter (965) for information regarding my miniature models. The articles required are, florists' wire, which you can buy in 1*d.* reels, fine tissue paper 4 sheets 1*d.*, 25 post-cards 1*d.*, seccotine 6*d.*, packet of steel pins 1*d.*, a piece of thin tin 1½ ins. square, and the elastic used is ⅛ in. strip, out of a golf ball.

Fig. 1. Showing side view of finished machine and position of planes on main stay.

Fig. 2. Plan showing position of wheels and method of fixing tissue paper over wire frame.

Fig. 3. Shows how to fix wire frame of plane to main stay, also hook for elastic.

Fig. 4. Shape to be cut out of tin showing arms which the cardboard blades have to be stuck to.

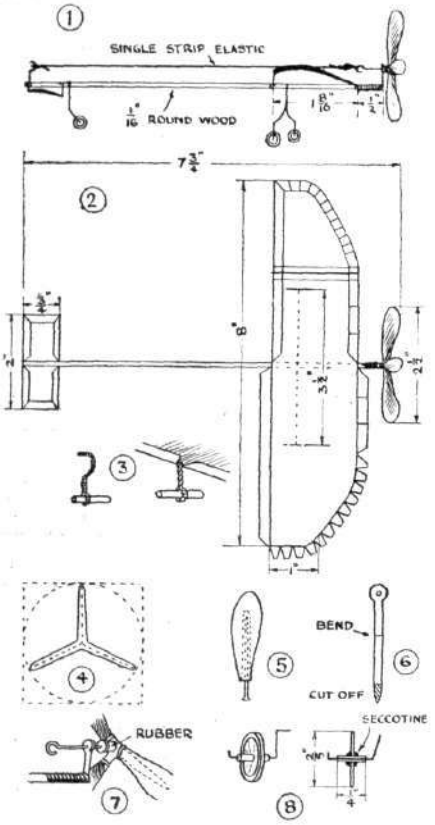



Fig. 5. Shape of blade (three to be cut together) with a pin pushed in from the edge which makes a slot for the tin arms to fit into.

Fig. 6. Propeller bearing made out of pin hammered out and hole drilled through head. The pin is then bent at right angles about ½ inch from head.

Fig. 7. Shows how the spindle is made and fastened to the in arms. Make a washer out of pin head with hole drilled through. A piece of $\frac{1}{16}$ in. rubber about ⅛ in. long slipped over wire keeps the propeller from catching.

Fig. 8. Shows how spindle is made. The bushes of the wheels are made out of ¼ in. lengths of whisk with the pith pushed out by a piece of wire, thicker than that which is used for spindle. The shaded part in Fig. 2 shows flanges stuck over into position on wire frame.

Leeds. L. BAXTER.

## IMPORTS AND EXPORTS, 1910–11.

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910).

| | Imports. | | Exports. | | Re-Exportation. | |
|---|---|---|---|---|---|---|
| | 1910. | 1911. | 1910. | 1911. | 1910. | 1911. |
| | £ | £ | £ | £ | £ | £ |
| January | 2,516 | 1,196 | 750 | 1,088 | 550 | Nil |
| February | 437 | 3,129 | 2,950 | 1,786 | — | — |
| March... | 7,516 | 11,327 | 128 | 1,027 | 600 | 357 |
| April ... | 6,305 | 2,110 | 950 | 807 | 1,470 | 4,343 |
| | 16,774 | 17,762 | 4,778 | 4,708 | 2,620 | 4,700 |

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## Aeronautical Patents Published.

**Applied for in 1910.**

*Published May 11th*, 1911.

10,253. W. E. SCOTT AND W. W. PEET. Aeroplanes.
14,727. C. J. LANE AND C. J. T. BIRTS. Aerial machines.
21,096. R. WILCKE AND A. GRAFF. Aerial propeller.

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July 29–Aug. 5 .. *Daily Mail* Round England Contest.
Oct. 31 .. Close of British Michelin Cup.

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May .. Paris—Bordeaux—Paris.
June 18 .. European Circuit—Paris, Brussels, London, Paris.
July .. Italian Circuit.
July 1–13 .. Circuit Berlin—Hanover—Hamburg.

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